LOCHSA FACE - POINT SOURCE BURN PLAN

Powell Ranger District
Clearwater National Forest

LOCHSA FACE--POINT SOURCE

BURN PLAN

June 15, 1987

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Clearwater National Forest

Prepared by: ______________________
Tim Rich, AFMO
Powell RD

Reviewed by:

____
Dave Thomas, FMO
Powell RD

____
Dan Davis, Wildlife Biologist,
Clearwater NF

____
Dick Kramer, Biologist,
Powell RD

____
Chuck Petersen, Air Operations
Clearwater NF

Recommended by:

____
Larry Keown, District Ranger
Powell RD

____
Gary Meyer, Fire Staff
Clearwater NF

Approved by: ______________________
Jim Bates, Forest Supervisor
Clearwater NF

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INTRODUCTION

The Lochsa Face country is a roadless area located between the Selway-Bitterroot Wilderness (SBW) and the Lochsa River, on the south end of the Powell Ranger District. This plan documents a thought process to implement a prescribed fire to meet wildlife habitat improvement and natural fuel abatement objectives within the Lochsa Face area. All eleven elements of the normal prescribed fire planning process are included.

Burning is to be accomplished from several "point source" ignitions, rather than the more customary approach of burning a specified area in a given day, the burn block method. This approach is similar to the National Park Service's lightning fire simulations in Yosemite National Park.

There are advantages and disadvantages of selecting the "point source" method over waiting until the right day and lighting all at once. Simulating a lightning fire will result in a more ragged burn edge. This is important for wildlife utilization and will appear more "natural". Fires will burn under a variety of conditions which will result in a wide variety of fire effects, and thus vegetative diversity over space and time. Picking the time and place will give us the advantage of minimizing detrimental biological effects and decreasing the risk of an "unmanageable" fire occurring. The point source method will also serve as a test for future applications of planned ignitions in Wilderness areas.

Targeted acres may not be accomplished using the point source method, due to unfavorable weather conditions developing. However, by waiting until later and lighting all at once, there is the risk of burning no acres. The risks of having either too much fire or too little fire are probably equal between the two methods. As with all prescribed burning, our inability to accurately predict the weather could result in either a larger fire or a smaller fire than what is desired. One purpose of the planning process is to minimize those risks.

BURN GOALS AND OBJECTIVES

The goal of this project is to partially implement the fish and wildlife goals of the forest plan: "manage elk summer habitat to optimize potential for elk within visual quality objectives and limitations necessary to maintain recreation settings." Prescribed fire can best meet elk habitat and visual quality objectives.

Burn Objectives

1. Duplicate the beneficial biologic effects for big game of a naturally occurring lightning fire, while minimizing detrimental effects on soils and watershed.

   Lightning fires have had both positive and negative effects in the Lochsa Face area. Big game food supply increased following the large fires of the early century, but soils were probably damaged in places. Because early and late season prescribed fires have been ineffective in achieving desired plant response, a summer burn is needed to achieve the desired results.

Duplicating a naturally occuring lightning fire could not only achieve these results but provide these additional benefits:

a. Result in a more ragged burn edge.

b. Have a more "natural" appearance--important for visual quality objectives.

c. Would be more politically acceptable adjacent to the SBW.

2. Work to eventually achieve a 50/50 cover/forage ratio within the Lochsa Face Area.

Currently, vegetation of the Lochsa Face Area is primarily thermal and hiding cover for big game. Existing forage is 50 year old brush and lacks nutritional value. Reburning existing brush areas could have long term detrimental results, and will not accomplish the objective. For example, spring burning in redstem ceanothus can stimulate sprouting, but does little for establishing new seedlings, and may even deplete stored seed in the duff. The objective of this burn is to convert older conifer stands and conifer regeneration areas to earlier successional stages to provide more acres of potential forage for big game.

Table 1 illustrates approximate maximum acres by sub-compartment needed to achieve the desired cover/forage ratio. Based on observations of past fires in these vegetation types, approximate total burned acres that will achieve the desired results are also noted. Total acres are based on the assumption that generally only one-third of the total area burned is stand replacement type fire in these timber types.

Table 1. Approximate treatment acres needed to accomplish a 50/50 cover/forage ratio by sub-compartment.

Sub-compartment	Stand replacement acres	Total acres
640-1	560	1680
640-2	600	1800
640-3 & 4	500	1500
640-5	600	1800
640-6	250	750

The ideal treatment accomplishment for this burn is approximately 1200 acres. Ideally, acres will not be continuous, at least one third of the burned area will be type conversion from conifer to forage, and ratio of burn perimeter to burn area will be maximized. Acre accomplishments are targeted in sub-compartments 640-2, 640-3 and 640-5 (see sub-compartment map).

3. Create fuel mosaics/barriers adjacent to the Selway-Bitterroot Wilderness (SBW) boundary.

The objective of SBW fire management is to allow as many lightning fires to burn as possible. Creating fuel mosaics adjacent to the SBW boundary will make it possible to liberalize prescriptions within the SBW boundary zone

and allow more fires to burn. This will also save money, as suppression in this remote area is expensive. For example, the Freezeout Fire of 1985, just inside the SBW adjacent to Lochsa Face, burned 260 acres and cost over $1 million to suppress.

We recognized that Objectives 1 and 3 are not specifically quantifiable, because this burn is not defined in the usual burn block fashion. We estimated that 100 to 2000 acres could burn. Success will be measured by the following criteria:

1. The fire(s) are ignited.
2. The fire(s) do not escape the project area <u>and</u> do unacceptable environmental damage.
3. FFF money is not expended.

BURN AREA DESCRIPTION -- CURRENT SITUATION

The burn area is located within the Lochsa Face Area in the Indian Meadows Creek drainage south of the Lochsa River (see map). The area is almost entirely within Management Area A3 of the Clearwater National Forest (CWF) Plan preferred alternative, except for approximately 600 acres of C8S in upper Mocus Creek. Management goals of Management Area A3 emphasize providing for dispersed recreation opportunity in semiprimitive setting, and managing for wildlife and fish habitats consistent with visual and dispersed recreation. Management goals of C8S are to maintain high quality fish and wildlife objectives while producing timber from the productive Forest lands.

This particular burn area was selected from the Lochsa Face Area for two reasons. The area is mostly within Management Area A3, and the area lacks vegetative diversity.

Fire history and occurrence

Fires in the Lochsa Face country have tended to be large but infrequent. Only small parts of the Lochsa Face area burned in 1910, however most of the burn area burned in 1919 and again in 1929. Only pockets of timber escaped the 1929 burn (see photo), but even some of these old growth pockets underburned during the fires. District records show that since 1945 seven fires, all less than 1 acre in size, have been suppressed in or within one mile of the burn area. Fire history of the burn area is consistent with fire history of the Lochsa Face Area in both number and size of fires. See Appendix 1 for detailed fire history of the Lochsa Face Area.

Fuels and Vegetation

Fuels within the burn area are not heavy for natural stands on north aspects, due to the repeated burns mentioned above. Fire behavior (FBO) fuel models 5, 8, and 10 predominate (see fuel model map), although pockets of different fuel models exist within general fuel types.

The photo of the 1929 fire illustrates large areas where stand replacement fires occurred. Older stands survived in the moist cedar draws, and an approximately 200 acre stand of older Douglas-fir/grand fir exists on a southeast aspect. This area is Ignition Point 1. Other old growth sites are

larch/Douglas-fir at the mid to upper elevations and spruce/subalpine fir types at the upper elevations.

Seral vegetation types occupying the site are decadent brush types and advanced conifer regeneration. The brush cover types are on the western edge of the area and on micro south and west aspects, and have not come back to conifers due to repeated and severe burning with possible soil damage that slowed succession. The conifer regeneration cover types (Douglas-fir/larch and lodgepole pine) make up approximately half of the area. Dead brush branches can be found under 50 year old closed canopy Douglas-fir/larch stands. A lodgepole pine stand of approximately 100 acres exists west of Flytrap Butte.

Another general cover type is small areas of ponderosa pine on south and west aspects, comprising less than 1 percent of the total area.

Brush species vary with aspect and site. Conifer reproduction on north slopes at mid elevations have almost entirely shaded out brush that came in following the 1929 fire. Based on species present on these sites, species that probably pioneered the area following the 1929 fire included mountain maple, serviceberry, thimbleberry, snowberry, ceanothus (redstem below 4000 feet, evergreen above), and willow. Evergreen ceanothus is present on harsher aspects at mid to upper elevations. Upper elevation sites are presently stocked with alder, menzesia, and huckleberry as understory shrub species on the more mesic sites. Lower elevation sites currently have oceanspray, ninebark, serviceberry, and snowberry as understory species.

Habitat types vary considerably. Most north slopes at the mid elevations are cedar types, with sub-alpine fir types at the higher elevations. South slopes are either Douglas-fir or grand fir habitat types.

The vegetative response to fire within each habitat type has been varied. Repeated fires have maintained seral conditions typical of the particular habitat types. The vegetative response of the proposed burn will be equally varied. On the grand fir types (Ignition Point 1), shrubs will occupy the site following fire where the canopy is removed, forbs where the canopy is not removed. Shrub species now present will increase in abundance and more fully occupy the site. On the north slopes (cedar and subalpine types) conifers will re-occupy the site sooner than on the less harsh aspects, however shrubs now present will dominate the site for approximately 20 years.

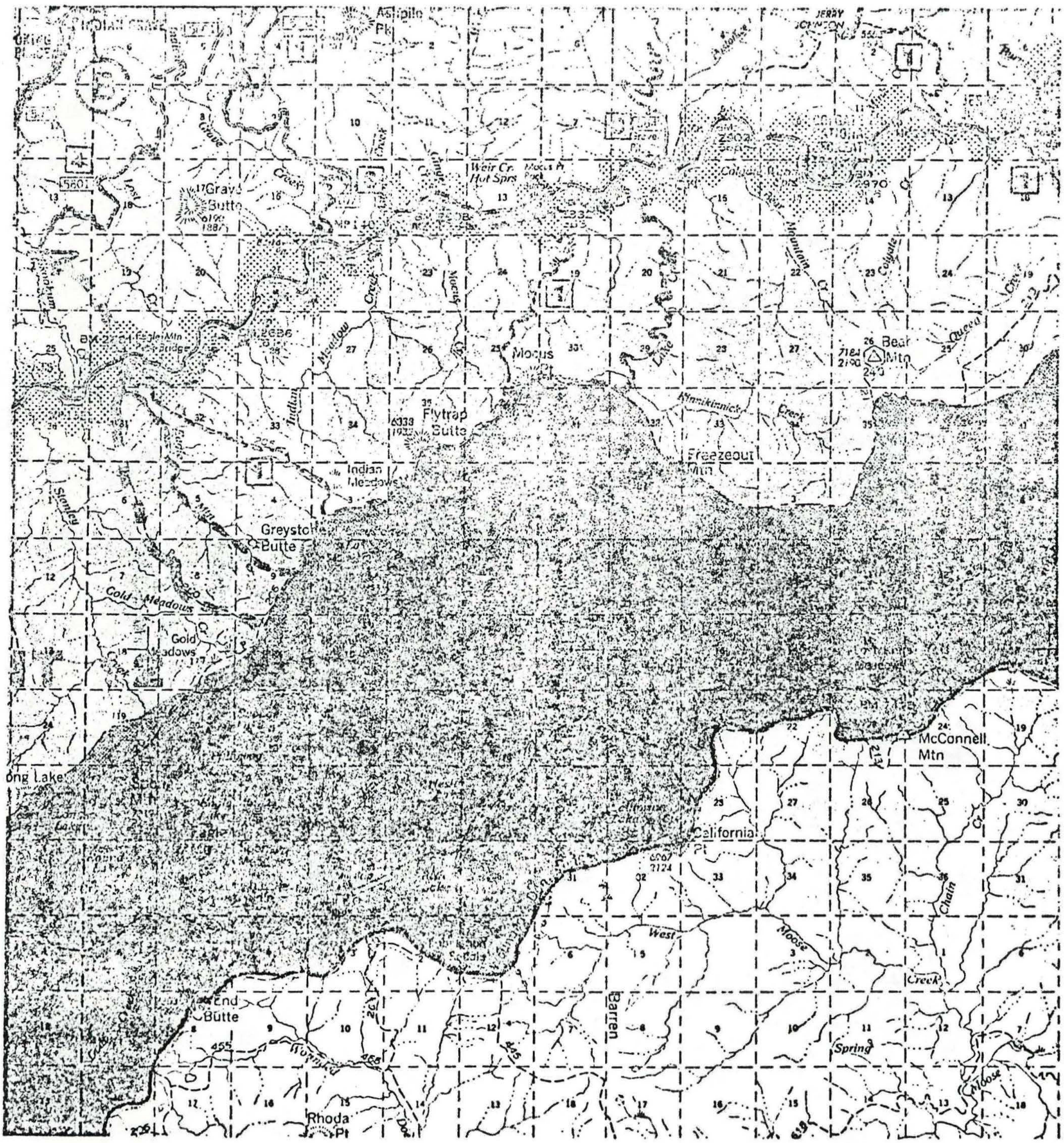
Big Game

The area is inhabited by elk, moose, and deer at all elevations. Old elk droppings were found in the vicinity of Ignition Point 1, possibly indicating winter use, and fresh sign was found from the ridge near H-3 to Flytrap Butte. Elk sign was scarce in the seral conifer stands. If the expected vegetation response occurs, big game use of browse should increase.

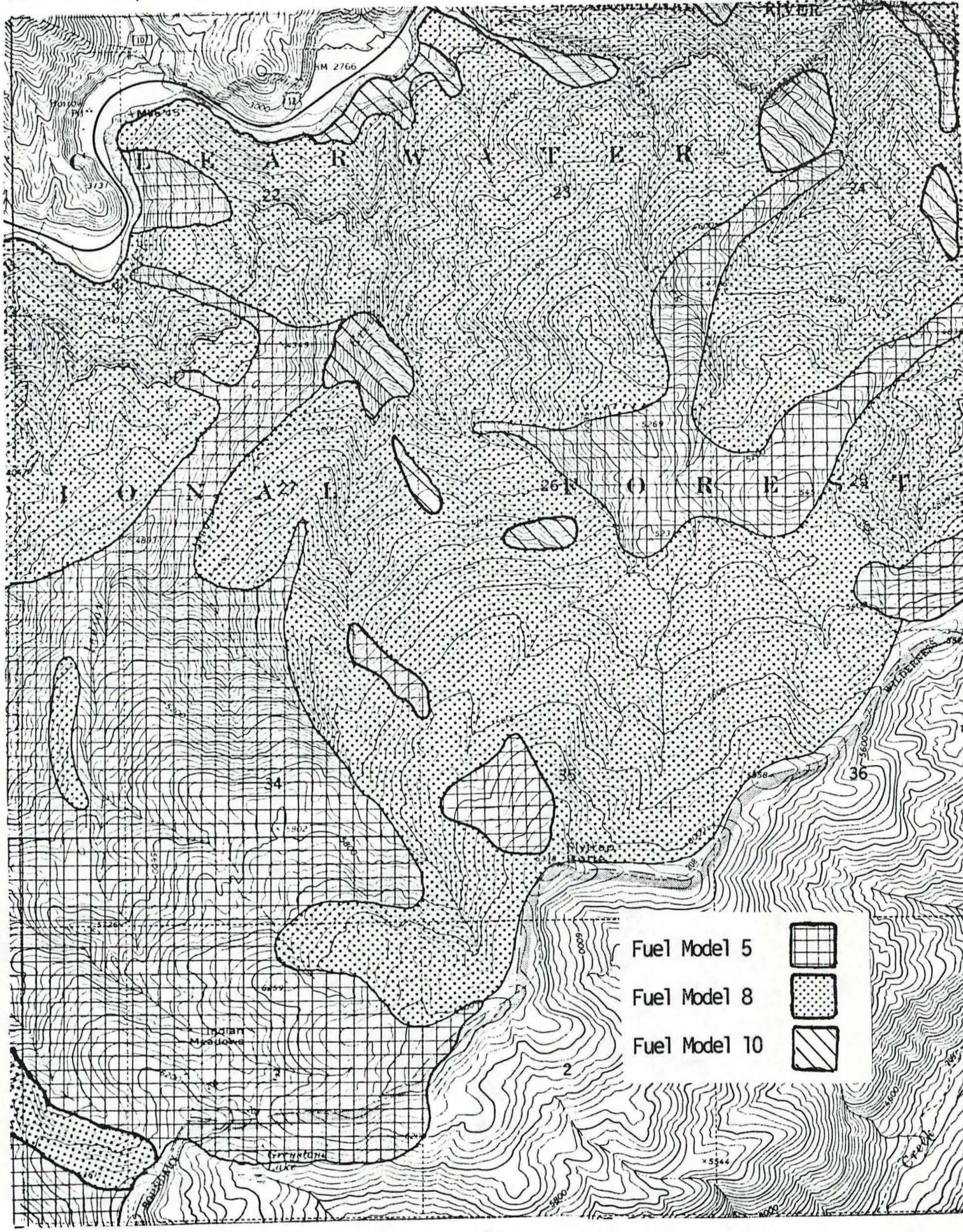
BURN PRESCRIPTION

Because of the wide range of fuel and weather conditions, one to seven ignition points will be needed. Ignitions points 1-3 are expected to burn 500 to 1500

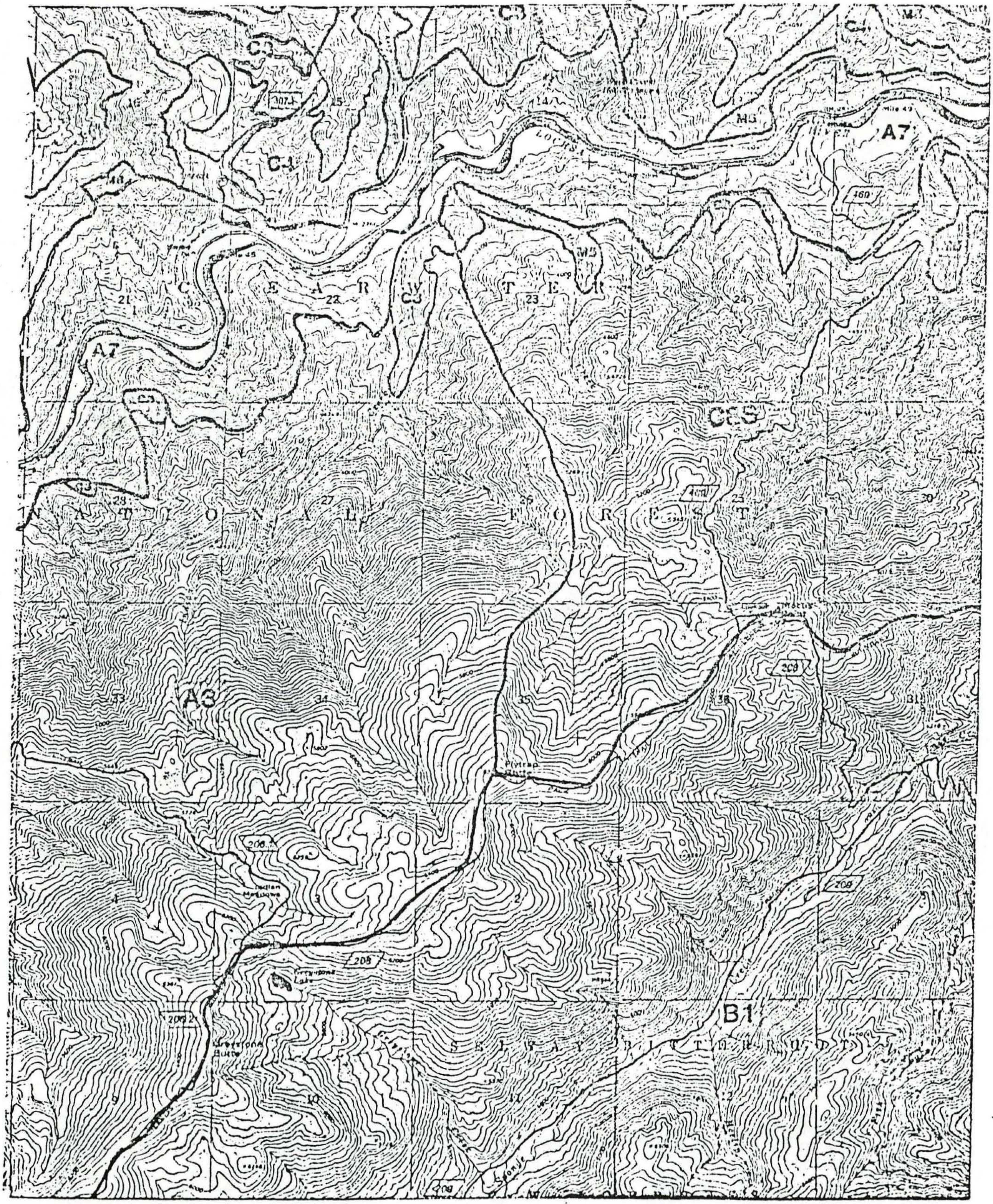
Project Area Map (identified by red dashed line).



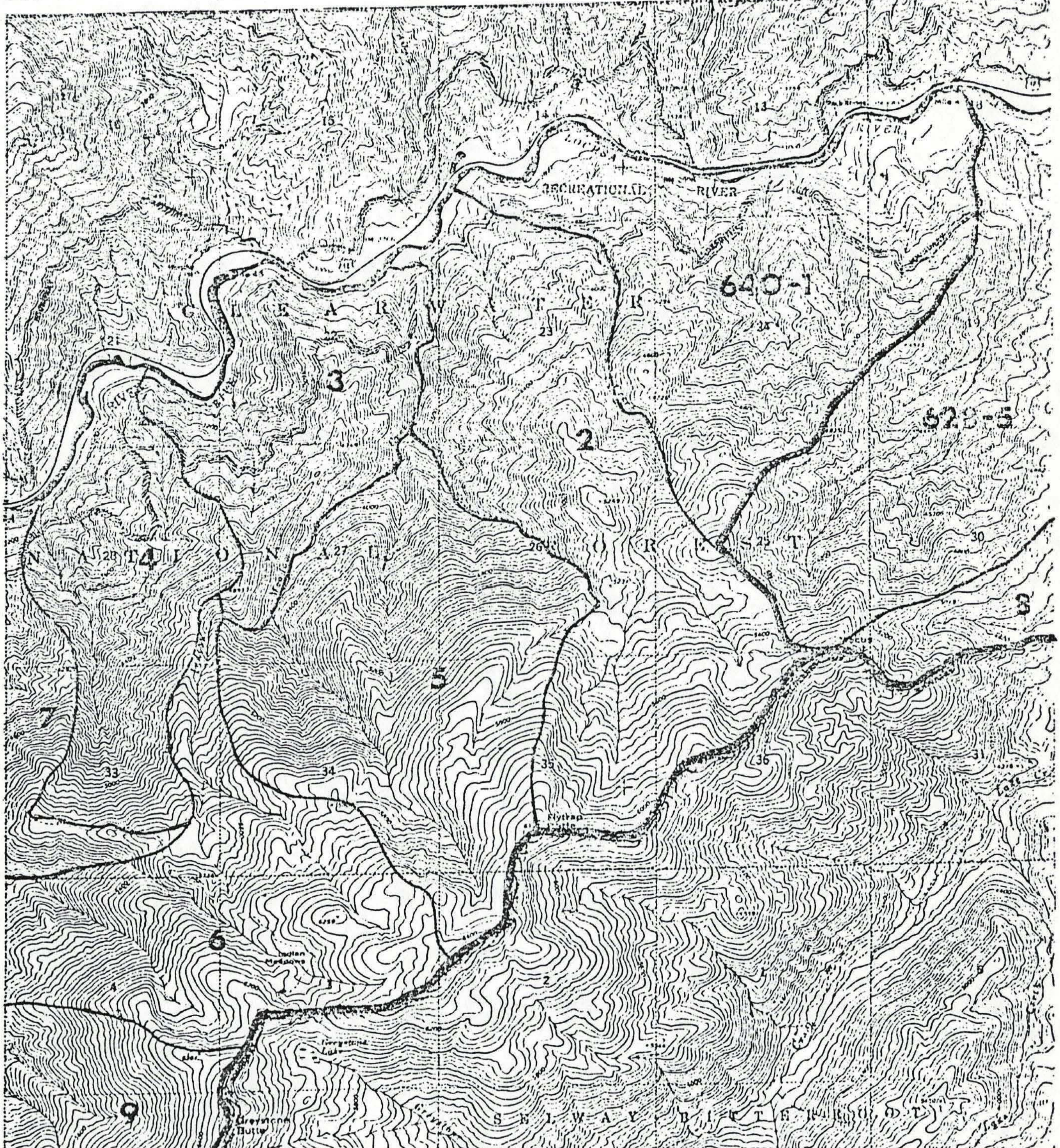
Fuel Model map for point source burn area.



Management Area Boundaries, Clearwater N.F. Draft Plan, preferred alternative.



Bear Mountain (628) and Indian Meadows (640) compartments and sub-compartment boundaries.



acres, however if alternate or additional ignitions will be lit if acre accomplishment is projected to be below targeted acres.

Prescription development was based on three criteria: (1) determining the broad fuel and weather conditions, (2) determining the best time of year to light, and (3) developing a prescription to obtain a sustainable fire on the day of ignition.

Determining the broad fuel and weather conditons.

Hot conditions are needed to obtain the desired objectives. One thousand hour timelag fuel moistures need to be low (less than 18 percent), and duff moistures need to be dry (less than 80 percent) to achieve the site preparation necessary for shrub seedling establishment. Local experience shows that without long term drying of fuels on north slopes and high elevations, fires do not spread readily. Live fuel moistures need to be lower than approximately 125 percent to contribute significantly to fire spread. These conditions can normally only be met during the late summer months.

ERC was picked as the prescriptive element to determine broad conditions. ERC is a good indicator of long term drying, because it fluctuates with daily changes in fuel moistures of all fuel size classes.

The prescription for lighting the burn is:

	Preferred		Acceptable	
	Min	Max	Min	Max
ERC	42	50	35	50
Percentile (1954-86)	85	94	75	94

Figure 1 illustrates the ERC mean cumulative frequency with selected high fire danger years for comparison. Note that the high fire danger years typically have many days at the middle to upper percentiles, rather than many "extreme" value days. Also note that the 33 year mean indicates that the ERC has climbed as high as 70. This occurred in the 1950's and maybe unreliable data.

Determining the best time of year to light.

The objective is to light late enough in the season to reduce the risk of lighting into an extreme fire danger season, and to reduce the number of burning days to keep the fire size within the objective. The fires must be lit early enough to be reasonably assured of obtaining the desireable weather conditions with enough good burning days to obtain the desired results.

Figure 2 illustrates mean ERC values by 10 day periods with selected recent high fire danger seasons for comparison. Note that in the periods of late July and early August the ERC is at the peak, and declines after mid August. The average percent occurrences of the preferred and acceptable ranges also decline after early August (Figure 3), but the few days that exceed the prescription range occur most often during August 11-20. In an average season, there are 17 days in the preferred ERC range, 37 days in the acceptable range, and 6 days would exceed the prescription range (Figure 4).

Figure 1. Powell R.S. ERC (Model G, Slope 4) cumulative frequency distributions for 1967, 1985, and 1954-1986 mean.

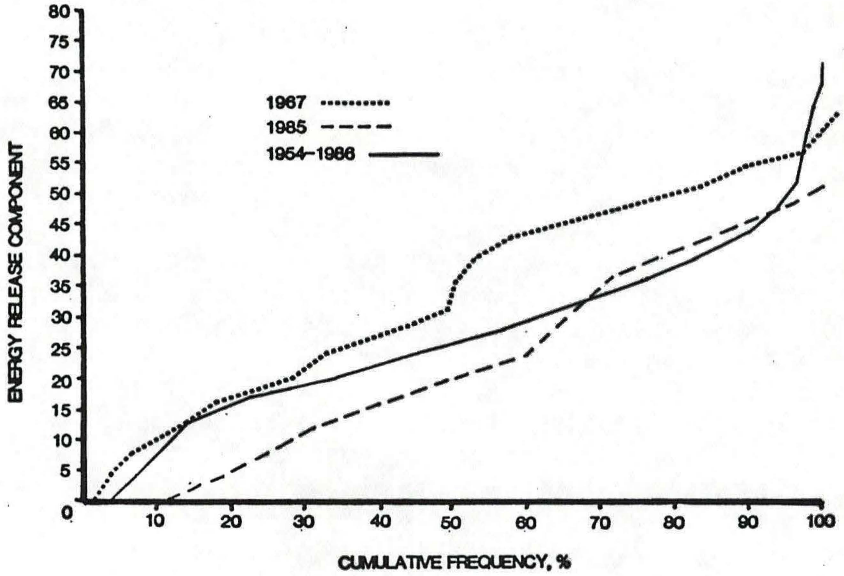


Figure 2. Powell R.S. 10 day mean ERC values (Model G, Slope 4) by 10 day period for 1967, 1985, and 1954-1986 mean.

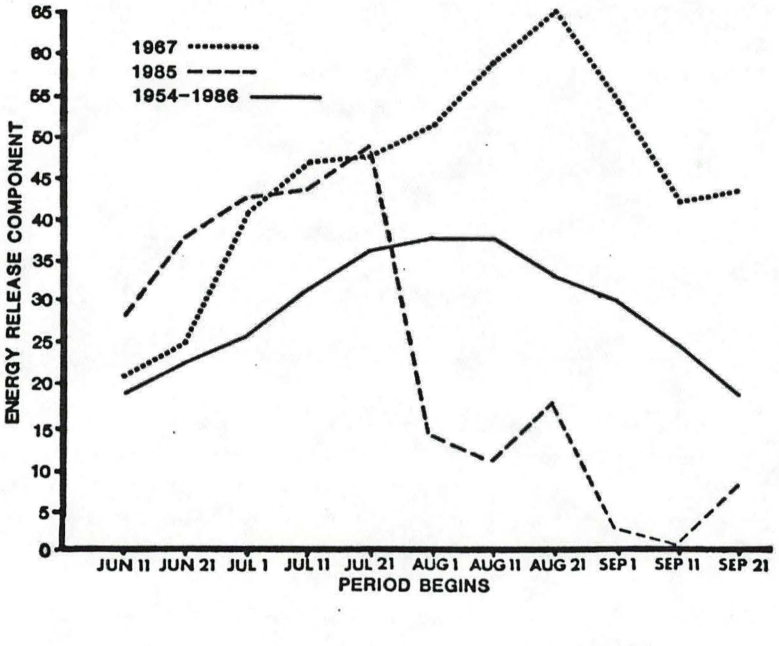


Figure 3. Percent occurrence of ERC (Model G, Slope 4) prescription days by 10 day period for Powell weather 1954-1986.

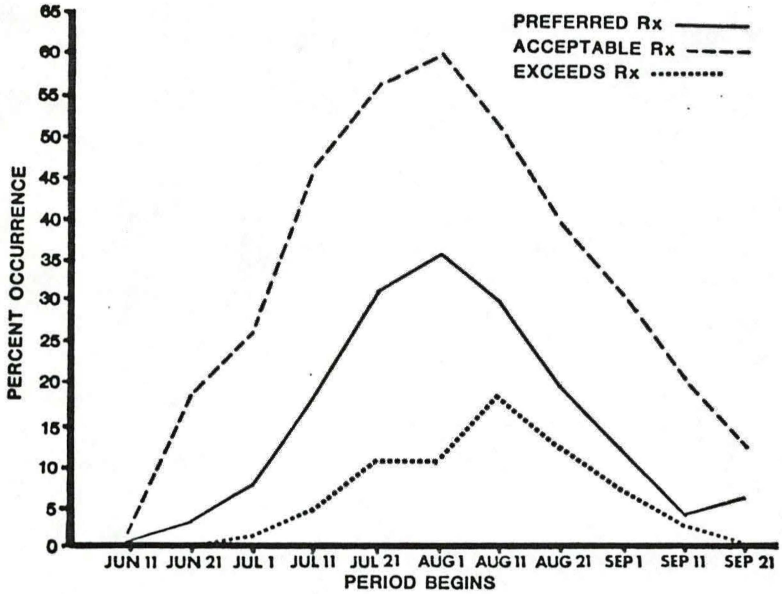
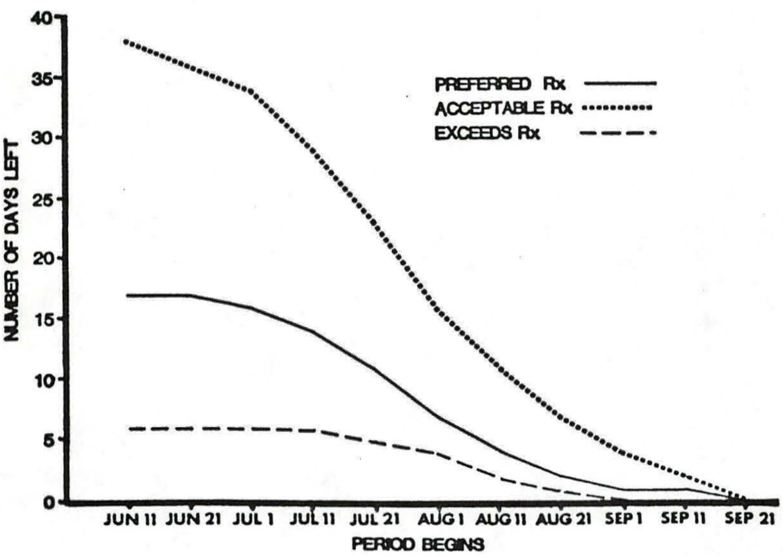


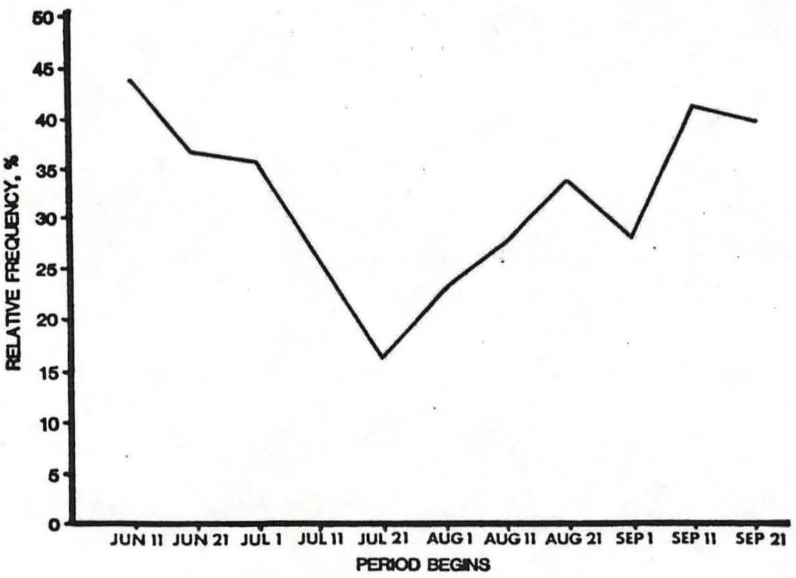
Figure 4. Mean number of prescription days left per season after each 10 day period for Powell weather 1954-1986.



For example, if ignitions occur after August 10, seven preferred days, 16 acceptable days, and four days exceeding prescription can be expected on the average. There would be 20 remaining burning days on the average if the days exceeding prescription are added to the preferred days, and 11 remaining days if the preferred days are added to the days exceeding prescription.

Note from Figure 5 that the average driest 10 day period is July 21-30. The period August 21-30 is significantly wetter than the period before or after. A late August rain event is a common occurrence, and is known to weather

Figure 5. Relative frequency of occurrence of days with more than a trace of rain, by 10 day period, Powell Ranger Station 1954-1986.



forecasters as the "August singularity".

The optimum time to light is in early to mid August. This time frame will be flexible to allow for variations in the ERC. For example, if the ERC is at the low end of the acceptable range, an earlier ignition will be desireable to take advantage of the maximum number of available burn days. The conditional probability graphs (Appendix 8) will be used to aid the decision to light.

Prescriptions to obtain a sustainable fire on ignition day.

Based on BEHAVE runs, Prescriptions were defined to obtain a spreading fire. Prescriptions were developed separately for Ignitions 1, 2, and 3. Alternate or additional ignition points have the same prescriptions as their counterparts. The criteria used for Ignitions 1 and 2 was to obtain a spreading, sustained fire. BEHAVE outputs define the prescription window for 1 hour fuels and midflame wind speed (Figures 6 and 7). The prescriptions are intended as guidelines; any combination of prescriptive elements that result in the desired fire behavior are considered in prescription.

Ignition 3 prescription criteria was based on fireline intensity needed to obtain a crown fire. BEHAVE predictions for fireline intensity and Martin Alexander's graph (Figure 11) were used. Expert opinion was also solicited. Dick Rothermel noted that too much wind (20 foot exceeding 20 mph) would tend to sheer off column development.

Figure 8 defines the prescription window for 1 hour timelag fuels, midflame wind speed, and live woody fuel moisture. For example, crowns were estimated at six to 10 feet above the ground. Foliar moisture contents rarely get lower than 110%. Using Figure 11, a fireline intensity of at least 175 to 400 is necessary to obtain crown combustion. Note that with a 2 mph midflame wind and 4% 1-hour fuel moisture, live woody moistures need to be less than 100%. Indications are that it will be difficult to obtain crown fire in this fuel type, because the conditions necessary occur infrequently. Several complex compensating factors apply, and any combination of factors that result in the desired fire behavior are considered in prescription.

Atmospheric instability is a preferred condition for Ignition 3. Instability intensifies combustion rates and allows for better smoke dispersal. Atmospheric instability is more common in July; stability becomes more common as the season progresses.

Table 2. Ignition Point Site Conditions

	Pt. 1	Pt. 2	Pt. 3	Pt. 4	Pt. 5	Pt. 6	Pt. 7
Fuel model	8--80%, 5--20%	10	10	5	10	10	5
Slope	50	30	50	40	50	60	45
Aspect	SE	W	NW	W	N	W	S
Elevation	4400	6000	4000	5600	5400	4000	5100
Cover type	DF	ES/SAF	WRC	LPP	WL	PP/DF	PP
SAF	210	206	228	218	212	237	237
Age Class	125+	150+	250+	55	250+	250+	45

Table 3. Ignition prescriptions. Any combination of factors that result in the desired fire behavior is in prescription. Elements maybe estimated or measured.

	Pt. 1 (Pt. 7)	Pt. 2 (Pt. 4	Pt. 3 (Pt. 5, 6)
Approx. dates	Aug. 1-25	Aug. 1-25	Aug. 7-30
Approx. time of day	1100-1400	1300-1600	1300--1700
Rate of Spread, ch/hr.	2-9	2-14	--
Fireline Intensity, Btu/ft/sec.	--	--	175-500
Fuel Moistures:			
10 hour	6-12	6-12	5-10
100 hour	10-16	10-16	8-16
1000 hour	12-18	12-18	10-16
Live woody moisture	75-175	75-150	50-125
Foliar moisture content	--	--	100-150
Temperature	70-90	70-90	70-90
Relative humidity	15-40	15-40	10-25
Wind direction, preferred	any	NE-SE	NW
acceptable	any	any	upslope

Long Range Fire Size Estimates Using FBA Techniques.

Fire behavior estimates were made using average weather from Jay Point for 1961 through 1975. It was assumed that Ignitions 1 and 2 occurred August 11, with 17 burn days available, and Ignition 3 occurred August 15, with 15 burn days available. Fire size estimates for Ignition Points 4-7 were estimated based on resulting fire sizes for Ignition Points 1-3. The resulting approximate fire perimeters are seen on the following map. See Appendix 3 for complete list of assumptions.

Ignition Point 1. This area will probably underburn with isolated torching. Fire spread will be rapid for a fuel model 8 because of the semi-open condition of the stand, but due to lack of fuel, intensities will be low. The fire will probably burn the entire southeast slope, but will back slowly into Indian Meadows creek, which will stop its spread. Spread will be slow backing down the northwest face from the ridgetop. Under average conditions, the final fire size is estimated at 140 acres.

Ignition Point 2. This area is brushy with menzesia and huckleberry. Fire spread, because of the higher elevation west slope will be influenced by general winds, usually southwest. Experience on the Powell District indicates that fires spread by spotting from torching subalpine fir. Spread is fairly slow but can be erratic in more extreme conditions. There is a chance that the fire may spread into the Wilderness, but it will be a backing fire if it does. Under average weather conditions, the estimated final size is 170 acres.

Ignition Point 3. The objective is to light a fire in Fuel Model 10 near the creek bottom that will carry into the crowns, which will in turn carry into the 55 year old reproduction. The reproduction area is fuel model 8, with not

enough fuel to generate a crown fire. Except for the crown fire, spread will be slow, but if dry conditions persist, there is a chance the area could underburn. Fahnestock's Crowning Potential Key rates the area "5" on a relative 10 point scale. Assuming some crown fire develops and pushes into the regeneration, final fire size is 200 acres.

Ignition Point 4. (Alternate for Ignition Point 1.) This area is even-aged LPP with huckleberry. Expect a slow spreading ground fire in brush, unless conditions get extreme, or the fire spreads into adjacent stands where more SAF exists. Final fire size is 70 acres.

Ignition Point 5. (Alternate for Ignition Point 3.) This area is older aged WL on a north slope. The same strategy will be used as for Ignition Point 3. Final fire size is expected to be 60 acres.

Ignition Point 6. (Alternate for Ignition Point 3.) This area is a mix of older PP and DF on west aspects with WL on the northwest aspects. The same strategy will be used as for Ignition Point 3. This fire has the potential to get large, due to more favorable aspects, but under average conditions, final fire size is about 200 acres.

Ignition Point 7. (Alternate for Ignition Point 1). This is the only other south exposure within the project area with any size. In a wet year, this area could be burned in addition to Ignition Point 1. Fuels are mostly brush with pole sized DF and PP regeneration. Assuming this area would be lit in a wet year when only south aspects would burn, total burned area would be about 160 acres.

Fire Size Estimates Using Conditional Probabilities.

Fire size estimates were made using a decision tree format (with probabilities) with a group of fire behavior experts and people familiar with the area. Results show that if these ignitions were repeated over time, approximately 1500 acres would burn annually. The largest total fire size from the three ignitions under worst case would total 8000 acres by this method. See Appendix 6 for complete results.

LOGISTICS

Pre-ignition Plan

Following is a list of pre-burn activities necessary to ignite, monitor, and evaluate the burn:

1. A portable Remote Area Weather Station (RAWS) will be installed near H1 in Section 28 (T.33N, R.11E) near the saddle west of Ignition Point 1 at approximately 4700 feet elevation. It will require helicopter transport. July 20.

2. Fuels will be sampled (see monitoring plan) within the general burn area at least 7 days prior to ignition to establish baseline data and calibrate RAWS. July 25.

Figure 6. Ignition 1 prescription.

```
 1--TWO FUEL MODEL CONCEPT   80%  8 -- CLOSED TIMBER LITTER
                             20%  5 -- BRUSH (2 FT)
 2--1-HR FUEL MOISTURE, %      2.0   4.0   6.0   8.0  10.0  12.0  14.0
 3--10-HR FUEL MOISTURE, %     6.0
 4--100-HR FUEL MOISTURE, %   12.0
 6--LIVE WOODY MOISTURE, %   125.0
 7--MIDFLAME WINDSPEED, MI/H    .0   1.0   2.0   3.0   4.0   5.0   6.0
 8--PERCENT SLOPE             50.0
 9--DIRECTION OF WIND VECTOR  45.0
     DEGREES CLOCKWISE
      FROM UPHILL
10--DIRECTION OF SPREAD        DIRECTION OF MAXIMUM SPREAD
     CALCULATIONS                TO BE CALCULATED
     DEGREES CLOCKWISE
      FROM UPHILL
```

FUEL MODEL 8 (80%) FUEL MODEL 5 (20%)

WEIGHTED RATE OF SPREAD, CH/H (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	1.	2.	3.	4.	5.	6.
2.	3.	4.	5.	6.	7.	9.	11.
4.	3.	3.	4.	5.	6.	7.	9.
6.	2.	2.	2.	3.	4.	5.	6.
8.	1.	2.	2.	2.	3.	4.	5.
10.	1.	1.	2.	2.	3.	4.	4.
12.	1.	1.	2.	2.	3.	3.	4.
14.	1.	1.	2.	2.	2.	3.	4.

```
1--RATE OF SPREAD, CH/H       OUTPUT FROM DIRECT. RANGE=   1. TO   11.
2--EFFECTIVE WIND, MI/H       OUTPUT FROM DIRECT. RANGE=  3.0 TO   7.1
3--ELAPSED TIME, HR           4.0
```

AREA, ACRES (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	1.	2.	3.	4.	5.	6.
2.	8.7	11.0	15.7	22.7	32.2	44.0	58.2
4.	5.5	7.0	10.0	14.5	20.5	28.0	37.0
6.	2.6	3.2	4.6	6.6	9.2	12.6	16.6
8.	1.6	2.0	2.8	4.0	5.6	7.6	10.0
10.	1.4	1.7	2.4	3.4	4.8	6.6	8.7
12.	1.2	1.5	2.1	3.0	4.2	5.8	7.6
14.	1.0	1.3	1.8	2.6	3.6	4.9	6.5

Figure 7. Ignition 2 prescription.

```
 1--FUEL MODEL                        10 -- TIMBER (LITTER AND UNDERSTORY)
 2--1-HR FUEL MOISTURE, %            2.0   4.0   6.0   8.0   10.0   12.0   14.0
 3--10-HR FUEL MOISTURE, %           6.0
 4--100-HR FUEL MOISTURE, %         12.0
 6--LIVE WOODY MOISTURE, %         150.0
 7--MIDFLAME WINDSPEED, MI/H          .0   2.0   4.0   6.0   8.0   10.0   12.0
 8--PERCENT SLOPE                   30.0
 9--DIRECTION OF WIND VECTOR          .0
      DEGREES CLOCKWISE
       FROM UPHILL
10--DIRECTION OF SPREAD               .0  (DIRECTION OF MAX SPREAD)
    CALCULATIONS
      DEGREES CLOCKWISE
       FROM UPHILL
```

RATE OF SPREAD, CH/HR (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	2.	4.	6.	8.	10.	12.
2.	2.	4.	7.	11.	16.	21.	27.
4.	2.	3.	6.	10.	14.	19.	24.
6.	2.	3.	6.	9.	13.	17.	22.
8.	1.	3.	5.	8.	12.	16.	20.
10.	1.	3.	5.	8.	11.	15.	19.
12.	1.	3.	5.	8.	11.	15.	19.
14.	1.	3.	5.	7.	11.	14.	18.

```
1--RATE OF SPREAD, CH/H        OUTPUT FROM DIRECT. RANGE=    1. TO   27.
2--EFFECTIVE WIND, MI/H        OUTPUT FROM DIRECT. RANGE=   1.4 TO  12.4
3--ELAPSED TIME, HR            4.0
```

AREA, ACRES (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	2.	4.	6.	8.	10.	12.
2.	4.8	13.2	32.9	64.2	107.1	161.7	227.9
4.	3.8	10.4	25.9	50.5	84.3	127.3	179.4
6.	3.1	8.7	21.5	42.0	70.1	105.8	149.0
8.	2.7	7.6	18.8	36.6	61.2	92.4	130.1
10.	2.5	6.9	17.1	33.3	55.5	83.9	118.2
12.	2.3	6.4	15.9	31.0	51.7	78.0	109.9
14.	2.2	6.0	14.9	29.0	48.3	73.0	102.8

Figure 8. Ignition 3 prescription.

```
 1--FUEL MODEL                         10 -- TIMBER (LITTER AND UNDERSTORY)
 2--1-HR FUEL MOISTURE, %             2.0    4.0    6.0    8.0   10.0   12.0   14.0
 3--10-HR FUEL MOISTURE, %            6.0
 4--100-HR FUEL MOISTURE, %          12.0
 6--LIVE WOODY MOISTURE, %          150.0
 7--MIDFLAME WINDSPEED, MI/H           .0    2.0    4.0    6.0    8.0   10.0   12.0
 8--PERCENT SLOPE                    50.0
 9--DIRECTION OF WIND VECTOR           .0
      DEGREES CLOCKWISE
       FROM UPHILL
10--DIRECTION OF SPREAD                .0   (DIRECTION OF MAX SPREAD)
     CALCULATIONS
      DEGREES CLOCKWISE
       FROM UPHILL
```

FIRELINE INTENSITY, BTU/FT/S (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	2.	4.	6.	8.	10.	12.
2.	106.	157.	244.	353.	478.	618.	771.
4.	85.	126.	196.	283.	383.	495.	618.
6.	72.	107.	166.	239.	324.	419.	522.
8.	64.	95.	147.	212.	288.	372.	464.
10.	59.	88.	136.	196.	266.	344.	429.
12.	56.	83.	129.	186.	252.	326.	406.
14.	53.	79.	122.	177.	240.	310.	366.

```
 1--FUEL MODEL                         10 -- TIMBER (LITTER AND UNDERSTORY)
 2--1-HR FUEL MOISTURE, %             2.0    4.0    6.0    8.0   10.0   12.0   14.0
 3--10-HR FUEL MOISTURE, %            6.0
 4--100-HR FUEL MOISTURE, %          12.0
 6--LIVE WOODY MOISTURE, %           50.0   75.0  100.0  125.0  150.0  175.0  200.0
 7--MIDFLAME WINDSPEED, MI/H          2.0
 8--PERCENT SLOPE                    50.0
 9--DIRECTION OF WIND VECTOR           .0
      DEGREES CLOCKWISE
       FROM UPHILL
10--DIRECTION OF SPREAD                .0   (DIRECTION OF MAX SPREAD)
     CALCULATIONS
      DEGREES CLOCKWISE
       FROM UPHILL
```

FIRELINE INTENSITY, BTU/FT/S (V3.3)

1-HR MOIS (%)	LIVE WOODY MOIS, % 50.	75.	100.	125.	150.	175.	200.
2.	352.	273.	220.	184.	157.	138.	123.
4.	284.	220.	177.	147.	126.	111.	99.
6.	241.	185.	149.	124.	107.	94.	84.
8.	213.	163.	131.	110.	95.	84.	75.
10.	194.	149.	120.	101.	88.	78.	70.
12.	179.	138.	112.	95.	[illegible]	74.	67.
14.	165.	127.	104.	[illegible]	79.	71.	[illegible]

Figure 9. Ignition 3 fire behavior output, Fuel Model 10.

```
 1--FUEL MODEL                    10 -- TIMBER (LITTER AND UNDERSTORY)
 2--1-HR FUEL MOISTURE, %         2.0   4.0   6.0   8.0  10.0  12.0  14.0
 3--10-HR FUEL MOISTURE, %        6.0
 4--100-HR FUEL MOISTURE, %      12.0
 6--LIVE WOODY MOISTURE, %      150.0
 7--MIDFLAME WINDSPEED, MI/H       .0   1.0   2.0   3.0   4.0   5.0   6.0
 8--PERCENT SLOPE                50.0
 9--DIRECTION OF WIND VECTOR       .0
     DEGREES CLOCKWISE
      FROM UPHILL
10--DIRECTION OF SPREAD            .0  (DIRECTION OF MAX SPREAD)
    CALCULATIONS
     DEGREES CLOCKWISE
      FROM UPHILL
```

RATE OF SPREAD, CH/HR (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	1.	2.	3.	4.	5.	6.
2.	4.	5.	6.	7.	9.	11.	13.
4.	4.	4.	5.	7.	8.	10.	12.
6.	3.	4.	5.	6.	7.	9.	11.
8.	3.	4.	4.	6.	7.	8.	10.
10.	3.	3.	4.	5.	7.	8.	10.
12.	3.	3.	4.	5.	6.	8.	9.
14.	3.	3.	4.	5.	6.	7.	8.

```
1--RATE OF SPREAD, CH/H       OUTPUT FROM DIRECT. RANGE=    3. TO   13.
2--EFFECTIVE WIND, MI/H       OUTPUT FROM DIRECT. RANGE=  [illegible] TO   7.4
3--ELAPSED TIME, HR           4.0
```

AREA, ACRES (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	1.	2.	3.	4.	5.	6.
2.	14.1	18.0	25.2	35.3	48.1	63.8	[illegible]
4.	11.1	14.1	19.8	27.8	37.9	50.3	64.9
6.	9.2	11.8	16.5	23.1	31.5	41.8	[illegible]
8.	8.0	10.3	14.4	20.1	27.5	36.5	47.[illegible]
10.	7.3	9.3	13.1	18.3	25.0	33.1	42.7
12.	6.8	8.7	12.2	17.0	23.2	30.8	39.7
14.	6.4	8.1	11.4	15.9	21.7	[illegible]	[illegible]

Figure 10. Ignition 3 fire behavior output, Fuel Model 8.

```
1--FUEL MODEL                     8 -- CLOSED TIMBER LITTER
2--1-HR FUEL MOISTURE, %        2.0    4.0   6.0   8.0   10.0   12.0   14.0
3--10-HR FUEL MOISTURE, %       6.0
4--100-HR FUEL MOISTURE, %     12.0
7--MIDFLAME WINDSPEED, MI/H      .0    1.0   2.0   3.0    4.0    5.0    6.0
8--PERCENT SLOPE               40.0
9--DIRECTION OF WIND VECTOR      .0
     DEGREES CLOCKWISE
      FROM UPHILL
10--DIRECTION OF SPREAD          .0  (DIRECTION OF MAX SPREAD)
    CALCULATIONS
     DEGREES CLOCKWISE
      FROM UPHILL
```

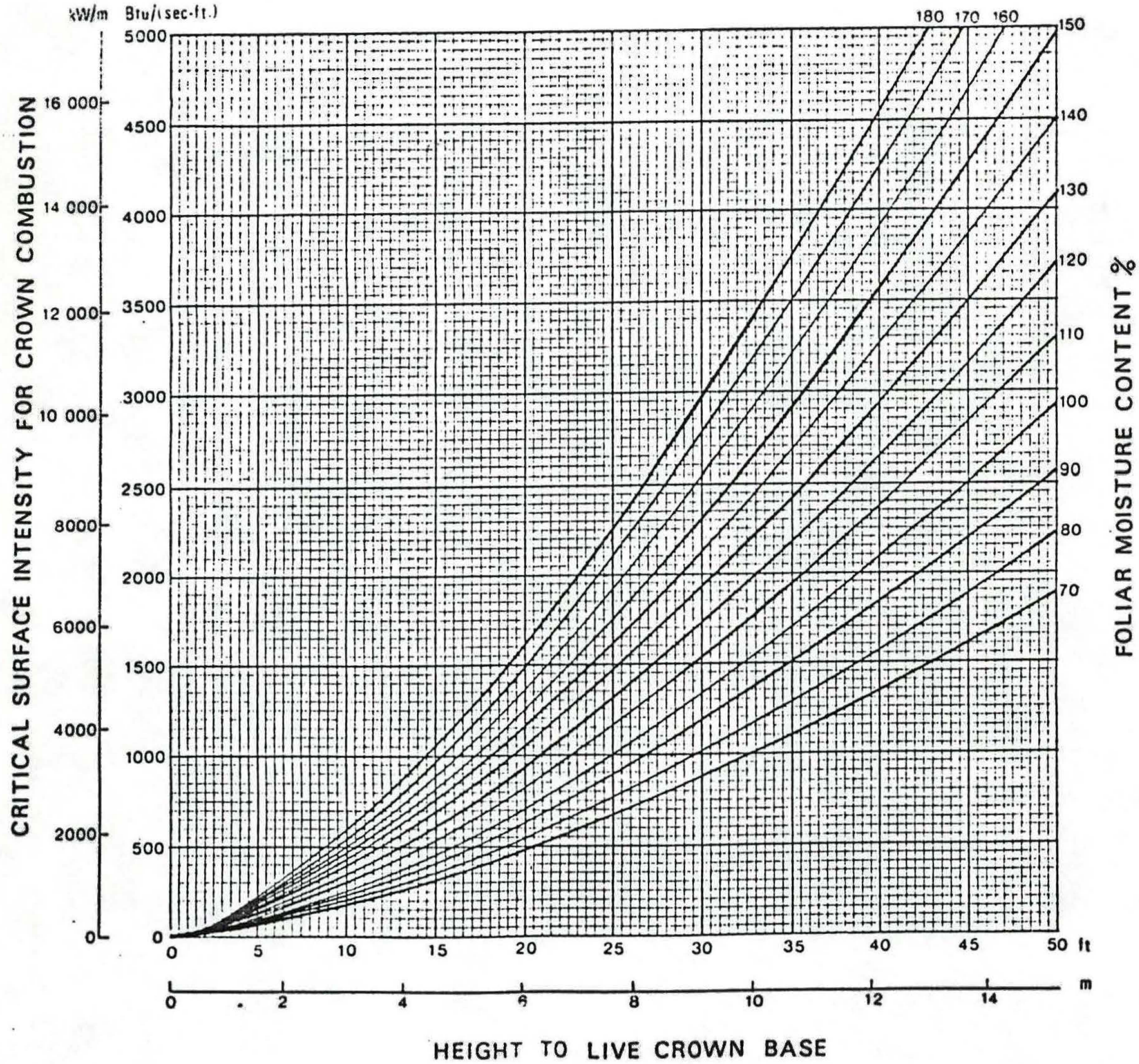
RATE OF SPREAD, CH/HR (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	1.	2.	3.	4.	5.	6.
2.	1.	1.	2.	2.	3.	4.	5.
4.	1.	1.	1.	2.	2.	3.	4.
6.	1.	1.	1.	2.	2.	3.	3.
8.	1.	1.	1.	1.	2.	2.	3.
10.	1.	1.	1.	1.	2.	2.	2.
12.	1.	1.	1.	1.	1.	2.	2.
14.	1.	1.	1.	1.	1.	2.	2.

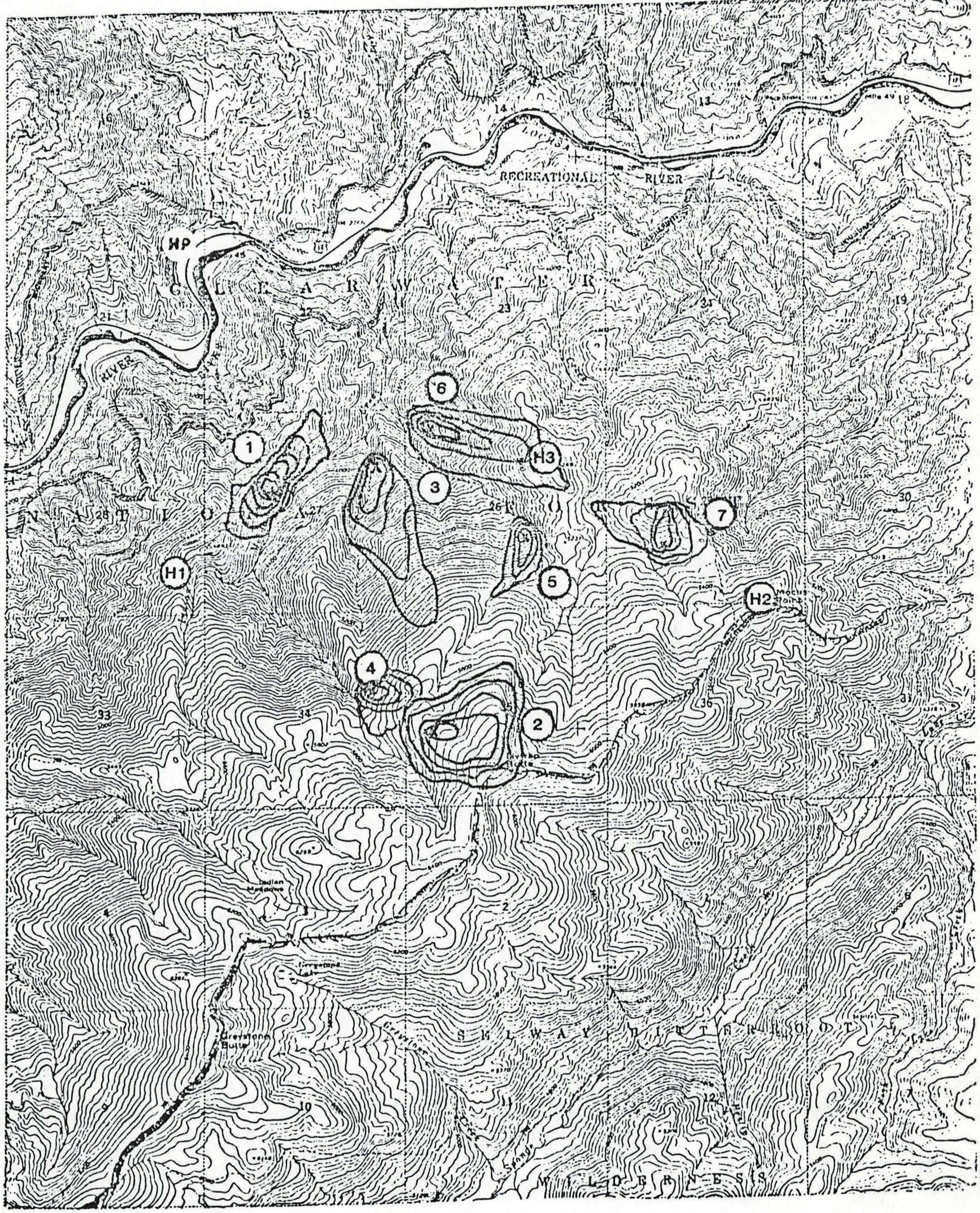
AREA, ACRES (V3.3)

1-HR MOIS (%)	MIDFLAME WIND, MI/H 0.	1.	2.	3.	4.	5.	6.
2.	1.3	1.8	2.6	3.9	5.6	7.8	10.4
4.	.9	1.2	1.7	2.6	3.7	5.1	6.8
6.	.6	.8	1.2	1.8	2.6	3.6	4.8
8.	.5	.6	.9	1.4	2.0	2.7	3.6
10.	.4	.5	.7	1.1	1.6	2.2	2.9
12.	.3	.4	.6	.9	1.3	1.8	2.4
14.	.3	.4	.5	.8	1.1	1.6	2.1

Figure 11. Surface intensity required for crown combustion.



Expected fire perimeter using average Jay Point Lookout weather for August.



3. Photo points will be located and taken at each ignition location. This may be done in conjunction with the stand exams. July 30.

4. A permanent photo point will be located and taken from the Lolo Motorway and the Saddle Camp Road. July 30.

5. Aerial photos will be taken of each ignition area prior to ignition. July 30.

6. The helispots at the RAWS location (H1), Mocus Point (H2), and H3 will need minor improvement. August 1.

7. Stand exam quick plots will be taken within the stands projected to be burned. August 1.

Ignition Plan

At least three sustained point source or line source ignitions will be lit within the project area, after the first of August. A sustained fire is one that shows smoke and perimeter growth following ignition. If weather conditions are such that the ignitions do not appear to be achieving the objectives, more ignitions may be lit and/or additional fire may be lit near the original ignitions.

Up to seven separate ignitions may be lit. Ignition Point 1 will be lit first, and will serve as a test fire for the project. Other ignitions will be lit; the number and timing dependent on the fire behavior of the initial ignition.

Prescribed fires may be ignited by lightning. Prescriptions are found in the CWF Fire Management Action Plan.

Ignition 1: Point source or line source ignition will be lit by hand, size or length depending on spread rate and will be up to the burn boss. Access will be by foot from H-1. Alternate or additional site is Ignition Point 7.

Ignition 2: Point source or line source ignition will be by hand or helitorch. Alternate location is Ignition Point 4. Point 4 is preferred if the ERC is toward the wet end of the prescription. Either hand or helitorch ignition will be used. If helitorched, the burn boss will be located up the ridge to the south of Flytrap Butte, or in a fixed wing aircraft.

Ignition 3: Point source, "J", or line source ignition will be lit by helitorch. The objective is to light a sustained fire in fuel model 10 that will develop into a crown fire. The burn boss will be located down the ridge to the north from H-3, or in a fixed wing aircraft. Alternate locations are Ignition Points 5 and 6.

If a sustained fire is not accomplished upon ignition, then the fire will be relit, possibly at the alternate site, on the next prescriptive day. Perimeter fire growth projections will be made with current weather and fuels data before ignition.

It is the intent of this plan to allow ground managers the flexibility to adjust, within the scope of this plan, ignition methods, timing, and numbers of ignitions to meet the stated objectives.

Post Ignition Plan

Significant perimeter will be mapped by the AFMO, and perimeter projections will be made for the next day based on weather forecasts by a qualified FBA. Fuel moistures will be ground verified as needed. Aerial, and ground photos if possible, will be taken of all fires. After fires are declared out, final perimeter maps will be prepared for each fire.

Decision to Light

The final decision to light will be made by the District Ranger. The FMO is responsible for fire load situation input data, and AFMO is responsible for fuels and weather input data for decision-making. Wilderness fires burning on the District and adjacent districts (Moose Creek, Lochsa) can indicate expected fire behavior.

Equipment and Personnel

	Equipment	Personnel
Pre-ignition:	RAWS Camera, wide angle, film Fuel measurement equipment Rebar, orange - 7 Helicopter Chainsaw 2 pulaskis Fuel sample bottles Backpack gear for 4	2 person fuels crew Helicopter manager
Ignition	1 case fuzees Helicopter Helitorch Camera 21 lbs. alumagel 150 gal. gas	1 Burn Boss 2 Ignition Boss 2 Ignition personnel 2 Weather Observers 4 Helitorch personnel
Post Ignition	Camera Fuel sample bottles Helicopter Backpack gear for 4	2 Weather observers 1 FBA or similar qualified

Personnel and Roles

Name	Position	Role
Larry Keown	DR	Line officer and final decision maker on go-no go decision. Has final decision on EFSA. Also provides technical input, such as fire behavior projections.
Dave Thomas	FMO, FBA	Prescribed Fire Manager. With DR, makes go-no go decision. Provides leadership and technical input, such as fire behavior projections. Leads EFSA team.
Tim Rich	AFMO	Burn Boss. Directs logistics of burn ignition and monitoring. Recommends go-no go decision. Responsible for daily mapping and fire spread projections.
Bill Kaage	Fuels tech.	Leads the fuels crew. Responsible for collecting and drying fuel samples. Will work as weather observer, ignition boss, and assist in daily mapping and fire spread projections.
Dick Kramer/ Dan Davis	Wildlife Biologists	Provides technical input. Observers.
Bill Heitler	Forester	Responsible for public information, safety, and signing.

SMOKE MANAGEMENT

Smoke will cause some visual impacts, mostly along the Lochsa River and the Lolo Motorway. Smoke could cause a safety hazard during night hours to motorists along Highway 12 (see Public Safety). Smoke is not expected to impact visibility in the SBW, but is expected to cause minor visibility problems at Powell, and could cause fire detection problems for Bear Mountain Lookout. Smoke is not expected impact the Missoula airshed significantly.

Smoke dispersal is generally more favorable during July, because of more days of atmospheric instability, and a smaller chance of subsidence forming. As the season progresses, upper level atmospheric stability is more likely. Lower level instability forms daily due to ground heating. After August, the chance of atmospheric stability forming for days on end increases. Formation of thermal belts is more likely later in the summer and fall. These layers of warmer air usually form between 4500 and 5500 feet elevation. Therefore, the earlier the burning the better the chance for good smoke dispersal. Ignitions in early August present a compromise between optimum smoke dispersion and optimum prescription conditions.

Smoke Predictions

Smoke from Ignition 1 will cause most of the problems along the river corridor. Inversions forming during the night, with smoke pooling down from Ignition 1 after dusk will cause a medium volume of smoke along the river. Visibility is not expected to impact traffic, unless fire size increases over the estimate, or a strong subsidence forms, allowing little dispersal during the day. This ignition is just below usual thermal belt formation, however smoke from burning activity during the day could layer in this elevation band, and cause visibility problems at midslope during morning hours. Since fuels are not heavy and will be relatively dry, smoke volume should be on the lighter side. Valley smoke will be at a maximum during the night and early morning, and with the daytime heating, smoke during the afternoon should ventilate.

Based on average wind speeds from Jay Point Lookout for August, approximately three days of poor visibility and eight days of moderately poor visibility can be expected. The poorest days will be toward the end of August. The potential for the greatest hazard due to poor visibility is from midnight to 6 a.m., when smoke pooling will be at the maximum along the river corridor.

Ignition 2 will impact areas east along the SBW boundary, but this is not expected to be significant. This ignition is in consistently wetter and heavier fuels, so the potential for more smoke volume exits. At this elevation, pooling at night will be minimal, and ventilation during the day good. Fire detection at Bear Mountain may be impacted for a few days during the most active burning days. This area is usually above the thermal belt, and the fire is expected to be inactive during the night, and very little smoke will end up down on the river.

Ignition 3 will add significant smoke to the river corridor, but only for the day of ignition and one to two days afterward. This will magnify the effects of Ignition 1, but will be short lived, especially if the fire is lit early enough in the day and relatively unstable atmospheric conditions exist at the time of ignition. After the first day, Ignition 3 should be a slow spreading fire in light fuels, producing a light volume of smoke. However, this fire could be active at night if the thermal belt forms, and some of the smoke would end up in the river valley.

MONITORING AND EVALUATION

Pre Burn Monitoring

The objectives of pre-burn monitoring are to be able to verify predicted fire behavior against actual, and to provide the base data necessary to evaluate the burn against the objectives.

Fuel moistures (1-hour, 10 hour, 1000 hr, live woody, and duff) will be monitored in the general burn area at least one week prior to the burn day. Fuel and duff moisture samples will be taken from the burn area three days prior to ignition at a minimum. If possible, soil moisture samples (at 8 to 10 inch depth) and foliar moisture samples will be taken prior to the burn.

Permanent photo points will be located within stands expected to burned. Duff depths will be sampled within these same stands.

Pre burn photos will be taken from viewpoints and the air to determine burned area and percent canopy removed.

Since this burn represents a unique opportunity to study fire effects, research people will be invited to participate in monitoring of ecological effects. This may include vegetation transects and preburn field trips for interested people. The District will assist with logistics on monitoring efforts by in-service or university research people.

Burn Monitoring

A crew of one or two will be on site periodically to monitor fuel and weather conditions, map perimeter growth, and document fire behavior once ignitions have taken place.

Rates of spread and flame lengths will be measured or estimated after ignition. Ignition points 1 and 2 present the best chances to do this on the ground. Actual rates of spread and flame lengths can then be compared to predicted.

Evaluation

Post burn evaluation will include final perimeter mapping, with ground truthing. Retaking the permanent photo points will be done if possible this fall, and 1 year after the burn. Duff depths will be remeasured in the fall. Evaluating the acreage target will be done from perimeter mapping from the air and ground. Mosaic requirements will be subjectively evaluated. Plant response will also be subjectively evaluated 1 year after the burn. Fuel continuity changes along the wilderness boundary will be subjectively evaluated within 1 year.

CONTINGENCY PLAN

If fires exceed prescription and a wildfire is declared, the appropriate suppression response will be applied, as identified in the CWF Fire Management Action Plan. Fires are declared wildfires if they are not meeting objectives, or they spread outside the Project Area (see map). An Escaped Fire Situation Analysis will be prepared if fire(s) are not returned to prescription with the initial response outlined below, or if project dollars can not cover the expense.

Initial actions based on the possible strategies are:

Spot fire or spread in	Strategy	Initial Action
B1, south	Control spots; Contain to A3 or C8S	2-10 firefighters, helicopter with bucket.
C8S, east	Control/Contain/Confine	Aerial observation to determine if timber damage.
North of Lochsa River	Control	Full control with least cost plus damages.
A3, west	Contain/Confine	Aerial observation

RISK ASSESSMENT

Risk can be defined as the probability that undesirable events resulting in negative consequences will occur. For this project, there are three main risks: (1) weather conditions will develop allowing more acres to burn than targeted for the sub-compartment or fires will reach unmanageable (and possibly catastrophic) proportions, (2) the fires will rain out before meeting the targeted acres, and (3) the ignitions will never occur due conditions being too wet or too dry. The following discussion of the probability of certain events occurring is designed to help managers in the decision-making process.

The data base for determining probabilities were the calculated daily ERC from FIRDAT for Powell Ranger Station 1954-1986.

Summary Statistics

In the last 33 years, 20 years (61%) have been in the preferred prescription range (ERC 42-50) sometime during August 1-10. 1979 was the last year in this range. Of those 20 years:

- -10 years (50%) had more than 10 consecutive days of ERC >45 after August 1.
- - 4 years (20%) had an ERC >=45 after September 1.
- -17 years (85%) had more than 0.2 inches of rain before September 1. Of those years, 13 years had more than 1.0 inch of rain before September 1.

In the last 33 years, 28 years (85%) have been in the acceptable prescription range (ERC 35-50) sometime during August 1-10. Of those 28 years:

- 10 years (36%) had more than 10 consecutive days of ERC >45 after August 1.
- 7 years (25%) had an ERC >=45 after September 1.

In the last 33 years, 6 years (18%) have exceeded the prescription range (ERC >50) sometime during August 1-10. These years were 1956, 1957, 1960, 1961, 1967, and 1969. According to the defined ERC prescription, we probably would not have lit in these years.

Arnold Finklin, research climatologist, retired from the Northern Forest Fire Lab, noted that July appears to be the key month in severe fire season development. Seventy-five percent of the severe fire seasons in Region 1 this century had a dry, warm July with precipitation below normal and temperatures above normal. Also, few severe seasons had a moist, cool June.

Probabilities of events occurring.

The decision maker is interested in two chief probabilities: (1) if conditions are in prescription and ignitions occur, what is the probability that fuel and weather conditions will change for an extended period of time allowing a fire that will exceed prescription, and (2) what is the probability that this will not happen? For example, if the fires are lit August 11 in the preferred prescription range, the probability of exceeding prescription (ERC >50 more than three consecutive days) after August 11 is .15, and the probability of this not happening is .18. If the fires are lit in the acceptable range, the probabilities are .15 and .48, respectively. The probability of exceeding the prescription range decreases as the season progresses, however so does the probability of being in prescription. Appendix 7 details the process and daily probabilities of these events based on the past 33 years.

PUBLIC SAFETY

Potential public safety concerns are for backcountry recreationists and for motorists on Highway 12 due to potential smoke pooling during the night. A few backpackers and horse packers use Trails #206 and #469 to access the SBW during the summer, and a few hunters use the project area beginning a few days before hunt season begins, around September 15. Jim Renshaw is the only summer outfitter that operates in the area, and Jack Nygaard is the only operator in the fall hunt season. Nygaard's spike camp at Indian Meadows is within the project area, and three of his camps are adjacent to the burn area: a base camp on Sponge Creek, an end of road camp at Eagle Mountain Pack Bridge, and a spring hunt/summer camp at Mocus Point Pack Bridge. None of the camp areas are expected to be impacted by the fire, however access to the Indians Meadows and Sponge Creek camps may be restricted by trail closures.

To assure the safety of backcountry recreationists, the folowing measures will be taken:

1. Sign trailheads at Eagle Mountain, Mocus Point, and Warm Springs packbridges. Signs will be in place by July 25, notifying the public of

our intentions to ignite a prescribed fire, with general safety precautions similar to wilderness prescribed fires. Ignition locations will be shown on a map. Prevention Tech.

2. Sign trail junctions of Tr. #206 and #469 (near Greystone Lake), and Tr. #208 and #469 at Mocus Point. Signs will be in place one week prior to ignition, and will notify the public of the intention to ignite a prescribed fire in the area, including general safety precautions similar to wilderness prescribed fires. Prevention Tech.

3. All outfitters will be notified of our intentions, and informed if a problem pertinent to their operations develops. I&E Coordinator.

4. No trails will be closed unless they pose an immediate safety hazard.

5. Signs will be updated as long as the fires are active. Prevention Tech

6. Other actions in the case of severe fire behavior will be taken, and may include ground patrol and/or aerial patrol to warn the public, manditory registration of people traveling in the area, and closing of the entire burn area.

If smoke pooling on Highway 12 becomes a hazard, the following actions will take place:

1. To check for possible visibility hazards, a night patrol will periodically drive the Highway during the late night hours.

2. If a problem occurs, warning signs will be posted.

3. Severe problems will require further action, including hazard signs, and posting of personnel to slow traffic.

COST AND FUNDING

This burn is funded primarily from wildlife (060811), with $6,000 donated by the Rocky Mountain Elk Foundation. Some of the funds will also come from natural fuel abatement (061150).

Cost Estimates:

Personnel wages	$12,361
Travel, per diem	990
Helicopter, 15 hours @ $400/hr.	6,000
Fuel, gas and alumagel	600
Miscellaneous	874
Total	$20,825

POWELL DISTRICT LOCHSA FACE PRESCRIBED FIRE I & E ACTION PLAN

ACTION	RESPONSIBILITY	DUE DATE	STATUS
Presentation to SO Management Team	Keown	1/ /87	Complete
Update Idaho Fish & Game Dept.	Rich/Thomas All	2/19/87 Ongoing	Complete
Contact Rocky Mountain Elk Foundation	Davis	2/27/87	Complete
Contact Royce Williams (Idaho Outdoors Television Program)	Davis/Murphy	3/2/87 Ongoing	Complete
Work with IF & G to get a Magazine Article for "Idaho Wildlife"	Davis/Murphy	3/2/87 Ongoing	Complete
Forest FMO Meeting Presentation	Thomas/Rich	3/5/87	Complete
Powell Forest Biologists Meeting	Kramer	3/ /87	Complete
Contact Fish & Wildlife Service	Davis/Kramer	3/9/87	Complete
Article for Bugle	Kramer	Winter	
Presentation to Orofino Rotary Club	Davis/Meyer	3/27/87	
Presentation to Nezperce National Forest	Davis	3/27 & 3/28/87	
Update Nez Perce Tribe	Davis	3/27 & 3/28/87	
Presentation to University of Idaho	Davis	3/27/87	
Presentation to Powell District	Rich	3/30/86	
Highway 12 Warning Signs	Depue/Heitler	4/1/87	
Update Outfitters (Nygaard/Renshaw)	Davis	4/10/87	Complete
Fact Sheet Flier to all Districts	Thomas	8/1/87	
High Country News Article	Thomas	5/1/87	
Presentations to the Orofino & Kamiah Chambers of Commerce	Davis/Mosier/ Meyer	5/1/87	
Presentation to Lewis & Clark Wildlife Club	Davis	5/1/87	

ACTION	RESPONSIBILITY	DUE DATE	STATUS
Presentation to RO (Fire, Wildlife & Public Affairs)	Bates & Co.	5/6/87	Complete
Presentation to Ecosystem Mgt. Group (RO)	Bates & Co.	5/6/87	
Contact Bill Loftus (Lewiston Tribune) and Steve Woodruff (Missoulian)	Murphy	5/15/87 Ongoing	
Presentations at SO and District Family Meetings	Davis/Bates/ Meyer	6/1/87	
FMO - Silvi. Field Trip	Thomas/Rich	7/10/87	Complete
VIS Display	Depue	8/1/87	
Flier to Powell´s User Groups	Thomas	8/1/87	
Lolo Motorway Interpretation	Depue	Ongoing	
Presentation to SAF	Keown	8/1/87	
Update Jack Nygaard	Powell	Ongoing	
Presentation to Powell Retirees, field trip	Heitler	9/1/87	
Don Tripp´s	Depue	Ongoing	
Video	Thomas	Ongoing	
Jim Mann flyover	Kramer/Kautz	July 30	
KUFM	Thomas	Ongoing	
Campground talks	Depue	Ongoing	
District Receptionists, VIS, and Campground Hosts	Depue, Thomas Kramer	July 30	
Community Meetings, Lolo NF, Missoula RD, RO Receptionists	Thomas	8/30/87	
Local Missoula and Idaho Co. Media	Murphy/Powell	Ongong	
DG update to SO, RO, Lolo NF, and Nezperce NF	Rich	Weekly	
Information Board - Lochsa Lodge	Depue	Ongoing	
Johnathan Taylor	Thomas	7/30/87	

This plan will serve as the basis for an aerial ignition method for the accomplishment of the burn objectives. All items within FSH 5799.12 - Helicopter Operations Handbook, Amendment 9, will be followed. The heliport operation will be directed by an approved helitorch team consisting of the Air Service Manager Heliport/Helitorch and Mixmaster plus a minimum of two additional workers.

If the heliport operation is contracted, then the burn boss will insure that all contract specifications are met.

The Burn Boss/Helitorch Boss will recon the unit(s) with the pilot prior to ignition to establish the ignition pattern, to identify the base heliport location and alternate helispot(s) (see attached map) and to identify any hazards indigenous to the area (snags, leave trees, wind shear patterns, ect.). The pilot will be briefed on the burn objectives, the holding plan and the contingency plan. A 300 gallon tanker will be used at the heliport for dust abatement, flushing/diluting fuel spills, and washing of personal gear/clothes in the event fuel is spilled on heliport personnel. The Air Service Manager will maintain radio communications with the Burn Boss and the pilot at all times. The communications system will be checked prior to ignition.

During flight with the helitorch, only the pilot will be on board. In all situations, the pilot will be solely responsible for the safe operation of the helicopter. General safety requirements will be covered in a briefing given to all personnel prior to ignition. Air operations safety as well as project related safety items will be discussed. ALL GROUND CREWS WILL BACK OFF THE LINE AND KEEP THEIR HEADS UP WATCHING THE TORCH WHEN IT IS OVERHEAD!!!

No crews will be on the firelines in the flight path at the time of firing. As the firing progresses down the unit, one or two people will burn out the lines as needed. (See Unit Burn Plan firing sequence map.)

Refer to the specific holding plans and contingency plans for details relating to the possible use of the helicopter for holding operations and/or control of possible escaped fires.

1987 Helitorch Module: Steve Mork, Lochsa RD
Tam White, North Fork RD

Heliport location: GRAVEL PIT AT SADDLE CAMP ROAD
(HP ON MAP)

REFERENCES

Albini, Frank A. Estimating wildfire behavior and effects. Gen. Tech. Rep. INT-30. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1976. 92p.

Arno, Stephen F.; Simmerman, Dennis G.; Keane, Robert E. Forest succession on four habitat types in western Montana. Gen. Tech. Rep. INT-177. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1985. 74p.

Bradshaw, Larry S.; Fischer, William C. A computer system for scheduling fire use. Part I: The System. Gen. Tech. Rep. INT-91. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1981. 63p.

Bradshaw, Larry S.; Fischer, William C. A computer system for scheduling fire use. Part II: Computer terminal operator's manual. Gen. Tech. Rep. INT-100. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1981. 34p.

Bradshaw, Larry S.; Fischer, William C. Computer programs for summarizing climatic data stored in the National Fire Weather Data Library. Gen. Tech. Rep. INT-164. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1984. 39p.

Brown, James K.; Marsden, Michael A.; Reinhardt, Elizabeth D. Predicting duff and woody fuel consumed by prescribed fire in the Northern Rocky Mountains. Gen. Tech. Rep. INT-337. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1985. 23p.

Davis, Kathleen M.; Clayton, Bruce D.; Fischer, William C. Fire ecology of Lolo National Forest habitat types. Gen. Tech. Rep. INT-79. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1980. 77p.

Deeming, John E.; Burgan, Robert E.; Cohen, Jack D. The National Fire-Danger Rating System--1978. Gen. Tech. Rep. INT-39. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1977. 63p.

Finklin, Arnold I. Climatic characteristics of severe fire years in the Northern Rocky Mountain area, 1910-84. 10/01/85 draft. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1985.

Harrel, R.D.; Cohen, Jack. Guidelines for predicting the effects of complex topography, energy release rates and atmospheric stability on prescribed fire behavior. Pacific Southwest Region Staff Paper; 1982 November.

Lotan, James E.; Kilgore, Bruce M.; Fischer, William C.; Mutch, Robert W., Technical coordinators. Proceedings--symposium and workshop on wilderness fire; 1983 November 15-18; Missoula, MT. Gen. Tech. Rep. INT-182. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1985. 434p.

Main, William A.; Straub, Robert J.; Paananen, Donna M. FIREFAMILY: Fire planning with historic weather data. Gen. Tech. Rep. NC-73. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1982. 31p.

Prescribed Fire and Fire Effects Working Team. Prescribed fire--Smoke Management Guide 420-1. NFES NO. 1279. National Wildfire Coordinating Group; 1985. 28p.

Radloff, David L.; Yancik, Richard F.; Walters, Kenneth G. User's guide to the National Fuel Appraisal process. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1982. 41p.

Rothermel, Richard C. How to predict the spread and intensity of forest and range fires. Gen. Tech. Rep. INT-143. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1983. 161p.

Salazar, Lucy A.; Bradshaw, Larry S. Display and interpretation of fire behavior probabilities for long-term planning. Environmental Management 10(3): 393-402.

Sandberg, D.V. Scheduling prescribed fires for wetter periods reduces air pollutant emissions. A paper presented at the Society of American Foresters/American Meteorological Society, Eighth National Conference on Fire and Forest Meteorology; 1985 April 29-May 2; Detroit, Michigan.

Saveland, James M. Forecasting fire danger and fire occurrence for wilderness fire management. A paper presented at the Society of American Foresters/American Meteorological Society, Eighth National Conference on Fire and Forest Meteorology; 1985 April 29-May 2; Detroit, Michigan.

Steele, Robert; Pfister, Robert D.; Kittams, Jay A. Forest habitat types of central Idaho. Gen. Tech. Rep. INT-114. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1981. 138p.

U.S. Department of Agriculture, Forest Service. Fire Management Plan--Frank Church-River of No Return Wilderness. 1986. 154p.

USDA - Forest Service **JOB HAZARD ANALYSIS** *(Instructions on Reverse and Reference FSH 6709.12)*	1. Identify Job or Project to be Analyzed Lochsa Face- Point Source Burn	2. Location Indian Meadows Cr.	3. Unit Powell RD.
	4. Name of Analyst Tim Rich	5. Job Title of Analyst AFMO	6. Date Prepared 7-31-87

7. Hazards	8. Actions to Eliminate Hazards *Specify safe work procedures and personal protective equipment.*
1. Transportation	
A. Helicopter travel	Follow guidelines in H & S code, p. 33 & 34.
B. Foot travel thru rough terrain, slipping on roots	Non-slip soles required. Long sleeve shirt and pants
and brush	required. Radio required.
C. Back packing- carrying heavy packs	Packs should not exceed 1/3 body weight.
-Keeping energy up.	Carry food and water.
-Giardia	Boil Water.
-Getting Lost	Cary map, compass and radio.
2. Ignition; hand	
A. Keeping track of ignition personnel	No more than 5 people will hand ignite.
B. Unfamiliar fuel conditions, dry prescription,	Experienced lighters with qualified complex burn boss
possible erratic fire behavior.	required. FBA will certify predicted fire behavior.
	Escape routes will be known to all.
C. Burns with fuzees.	Light away from body. Nomex, hard hats, gloves,
	eye protection required.

9. Approved By	10. Title	11. Date

USDA - Forest Service **JOB HAZARD ANALYSIS** *(Instructions on Reverse and Reference FSH 6709.12)*	1. Identify Job or Project to be Analyzed	2. Location	3. Unit
	4. Name of Analyst	5. Job Title of Analyst	6. Date Prepared

7. Hazards	8. Actions to Eliminate Hazards *Specify safe work procedures and personal protective equipment.*
3. Ignition; helitorch	
A. Splashing alumagel	No one will be in ignition area.
B. Working on heliport	Refer to Helitorch Operations Plan and FSH 5799.12.
4. Burn Monitoring	
A. Entrapment by fire	FBA will provide daily forecast when monitors are on
	on the ground. Fire shelters required. Radio
	communications required.
5. Helicopter loading and unloading	Follow quidelines in FSH 5709.12
-Remote, unexperienced helicopters	Improve helicopters. Pilots will o.k. use.

9. Approved By	10. Title	11. Date

APPENDIX 1.

Point Source Ignition Project
Fire History Reconnaisance

Introduction

On September 10-12, 1986, a fire history reconnaisance was conducted within the Point Source Ignition Project area. The goal was to produce a broad-resolution fire history analysis for fire management within the project area. Specifically, we sought applicable information for prescribed fire planning for wildlife habitat improvement along the Lochsa Face, between about Warm Springs Creek and Indian Meadows Creek. After office briefing and a fly-over of the project area, the Mocus Point Trail was selected as a representative sampling transect because the trail traverses a variety of vegetation types.

Results and Discussion

Eight sites were sampled along 7 miles of the Mocus Point trail (fig. 1), producing 20 increment cores from the area's fire-initiated age classes. Two fire scar samples also were obtained from redcedars along the lower part of the trail.

The data span about 300 years of fire history (the age of the area's oldest larch age class). The earliest evidence of fire-initiated stands dates back an estimated 500+ years, represented by a few widely scattered larch, but these trees were too scarce to allow interpretations about that period's fire history. Three major age classes occupy the project area: 1) the oldest larch stands regenerated after a large stand-replacing fire in about 1680; relatively large mosaics of this age class, as well as smaller stringer stands, are found primarily on moist aspects; this age class covers an estimated 30-40% of the area from Indian Meadows to Mocus Ridge, 2) a smaller age class of lodgepole pine, which regenerated after a fire in about 1836 and occupies the

Figure 1. Point Source Ignition Project area and Mocus Point Trail sampling transect.

middle- and upper elevations of the Flytrap Butte area (10-20% of the area), and 3) the younger age classes which regenerated over the broad area after fires in 1910 and 1929 (approx. 50% of the project area).

The data on fire frequencies suggest that stand-replacing fires occurred in the area on a cycle ranging from about 100 to 300+ years. The fire cycle varies according to the type of stand. For example, portions of the 1836 lodgepole age class evidently were replaced in the 1929 fire but substantial portions of the age class survived, yielding a range for stand replacement for lodgepole pine of from 93-156+ years. Evidence of mountain pine beetle infestation and stand decadence was noted during sampling, suggesting that lodgepole pine stands are nearing the upper end of their fire cycle by 150 years. This might have implications for containing fires in the upper elevations of the project area, since the lodgepole stands in the Flytrap Butte area straddle the Selway-Bitterroot Wilderness boundary. Younger age classes surround this area, however. These younger stands are in the early stages of the fire cycle and represent natural breaks in fuel continuity at the margins of adjacent older stands, so catastrophic fires are not expected under moderate burning conditions.

Stand replacement frequencies for larch stands are substantially longer. For example, large portions of the 1680 age class were replaced in the early part of this century (as evidenced by area snags), yet much of the age class also survived. This yields a stand replacement frequency of from 230-306+ years. Shorter fire frequencies were found on dry aspects, for example, where surface fires occurred after just 19 years in the project area (during the 1910-1929 period). Conversely, small pockets in the moist cedar bottoms evidently experienced fires on a much longer cycle than the surrounding drier stands, probably on the order of from 300-500 years.

Examination of aerial photographs and photo obliques taken in about 1935 and

1980 reveal the following important points (figs. 2-4):

1) The 3 age classes make up a relatively well mixed mosaic (i.e., there is not a large expanse of any one class), resulting in breaks in fuel continuity within the area.

2) At least 40% of the project area is occupied by small- to moderate size stands ranging in age from 150-300+ years old, and these stands are now approaching the mid- to upper end of the fire cycle.

3) The largest old growth stands rarely exceed 1000 acres, and examination of the area's mosaic might suggest the expected pathways of major fire runs in old stands (see figs. 2-4).

4) North aspects and creek bottoms support the oldest stands, suggesting that ignitions in these areas would need fire prescriptions adjusted for moist sites (or that, conversely, these sites might represent useful fire breaks within the area).

In terms of past fire behavior, the typical burning pattern was one of stand replacement in moderate- to large runs. The ca. 1935 and 1980 obliques, however, show that some of the larch stands (then about 250 years old) were heavily underburned, yet survived and eventually recovered stand dominance. Single fire-scarred larch are relatively common in the area, but few trees have more than one scar, suggesting that, at most, these stands typically survive only one fire fire during their lifespan. The implication for prescribed burning is that underburns are technically possible, but that severe scorching and mortality should be expected over much of the area.

The fire atlas also provided some useful information about the project area's fire history. For example, examination of lightning fire occurrence revealed 2 important aspects: 1) approximately 40 ignitions have been suppressed in the area since about 1945, and 2) lightning ignitions occurred most frequently above about 4000' elevation. The implication is that ignitions

Figure 2. Aerial photo shows current age class distribution in Mocus Cr. area. Gray stands are less than 75 years old; green stands are [illegible]-150 years; yellow stands are 150-300+ years. (Mixed colors indicate underburned stands).

Figure 3. Ca. 1935 oblique photo shows mixture of total stand replacement and heavily underburned 1680 larch stands in the aftermath of the 1910 and 1929 fires.

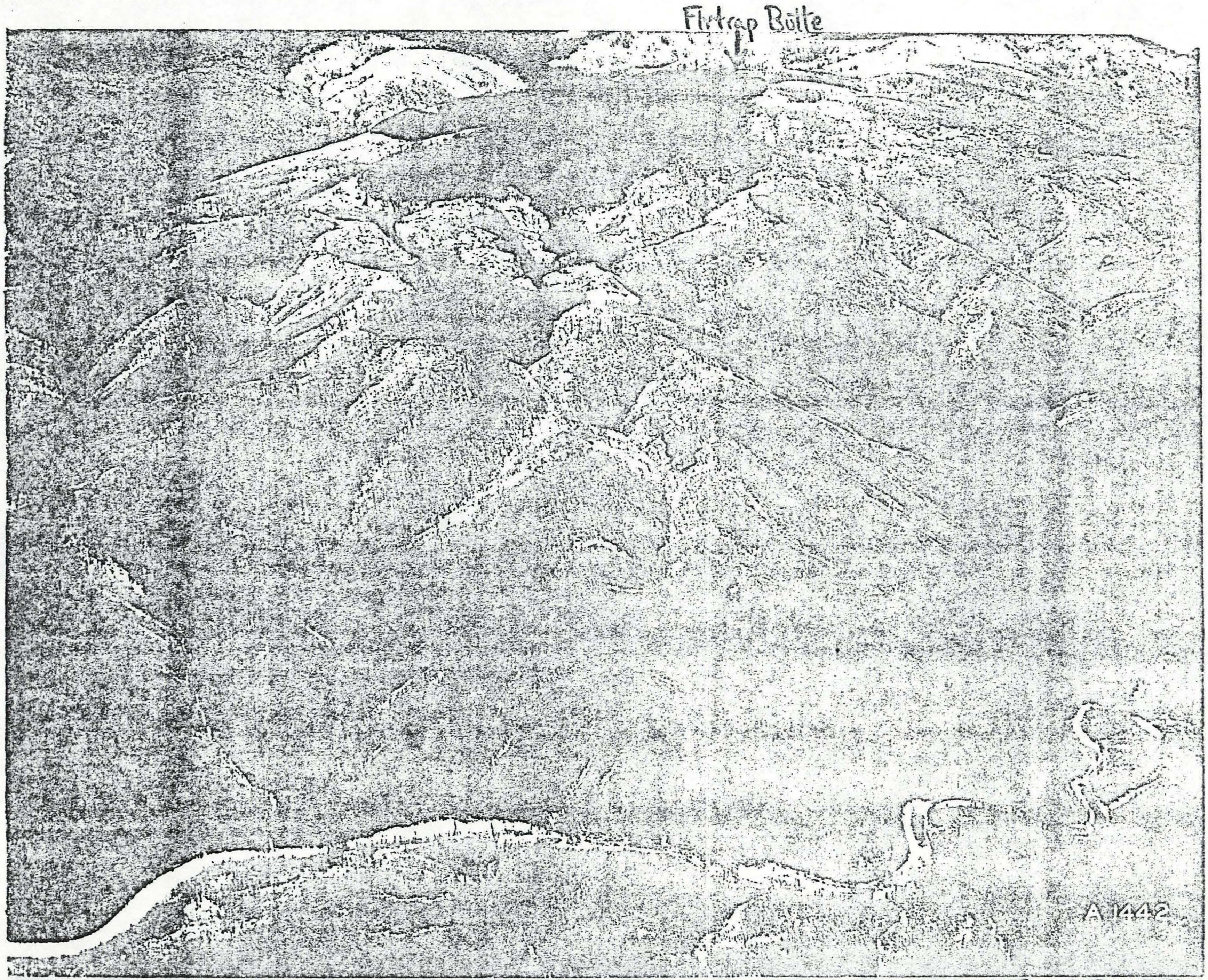
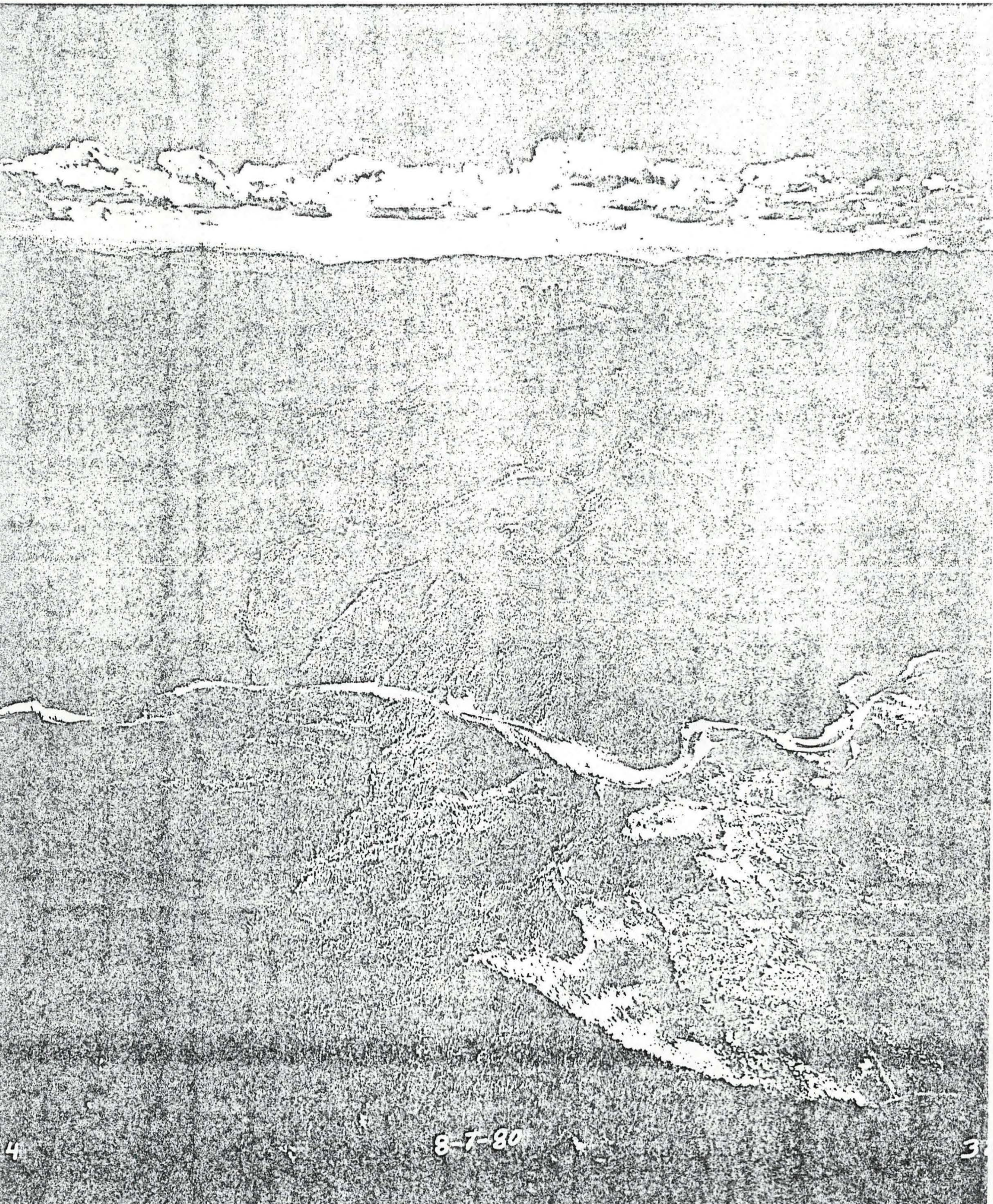


Figure 4. 1980 oblique photo shows landscape 45 years later. Discrepancies in coverage of colored stan(from 1935-1980 are the result (stand recovery after heavy underburning.



occurring in the mid- to upper elevations of the project area, where fuels are exposed to drying winds, might be expected to result in spreading fires more often than in the lower forests. Scheduled ignitions also might be difficult to apply in the lower-elevation stands if conservative prescriptions are used. A natural fire plan (unscheduled ignitions) would need to take all of these occurrence factors into account. For example, knowledge that area lightning fires are relatively frequent in the upper elevations would need to be weighed against possible containment problems in the vicinity of the nearby wilderness boundary.

In summary, the fire history data yielded the following interpretations for prescribed fire in the project area. First, 50% of the area is covered by forests ranging from 56-76 years old, or less; the historical replacement frequencies (100 years minimum) suggest that severe drought conditions (and liberal prescriptions) would be necessary for these forests to burn in the near future. Second, 50% of the area is covered by forests well within or at the upper end of the fire cycle, suggesting that these stands are now "burnable". The old growth stands, however, are well dispersed among the younger age classes (providing breaks in fuel continuity), so catastrophic fires are not indicated for this area under moderate burning conditions. Aerial photographs for the area reveal that most of the older stands are in the mid- to upper elevations, particularly near Flytrap Butte and the Wilderness boundary. From the standpoint of containment, the most logical area for scheduled ignitions probably would be in the Indian Meadows Creek drainage. This area contains old stands in the lower- and middle elevations, while the upper elevations near the Wilderness boundary are composed mostly of younger age classes. Conservative or moderate fire prescriptions might be expected to produce a patchy pattern of stand replacement and heavy underburning. This burning pattern probably would acheive the desired objectives of creating wildlife openings of variable size

in the area's tree canopy.

Prepared by:

Stephen W. Barrett
Research Forester
Systems for Environmental Management

APPENDIX 2. List of Projects for the Wildlife Enhancement Program (from the Lochsa Face Area Level Analysis).

Year	Project Description	Subcompartments	Acres	Cost
1987	Burn	640-02 640-05	1219	$ 20,825.00
1988	Burn	640-01 628-05	1110	$ 11,612.00
1989	Burn	628-07 628-06	1438	$ 12,762.00
1990	Burn	640-03 640-04	776	$ 12,112.00
		640-06		$ 0.00
1991	Burn	628-04	391	$ 10,512.00
1992	Seeding	628-08	860	$ 57,586.00
1992	Fertilizing	628-08	860	$ 78,443.00
1993	Seeding	628-04	610	$ 41,876.00
1993	Fertilizing	628-04	610	$ 54,716.00
1994	Seeding	628-06	310	$ 22,989.00
1994	Fertilizing	628-06	310	$ 33,006.00
1995	Slashing/Burning	640-08	300	$ 67,270.00
1996	Slashing/Burning	640-09	186	$ 43,210.00

640-07 - current priority

APPENDIX 3. Assumptions for fire spread calculations.

Jay Point weather was used. Weather was collected at the lookout (elevation 5438) from 1961 through 1975, usually from July through September. Co-occurence tables from program RXWTHR for 1 hour fuel moisture and wind was used to estimate daily conditions and number of burning days.

Assumptions were:

1. On days where 1 hour fuel moistures exceeded 15%, the fires did not spread.

2. 83% of the days in August had 1 hour fuel moistures less than 16%. The fires were lit August 11, leaving 17 burn days (83% of 20 days remaining in August.)

3. The low end of fuel moisture categories were used.

4. Wind speed was adjusted for site from 20 foot to midflame, and the highest end of the range was used for adjustment.

5. 10 hour fuels were 6%, 100 hour fuels were 12%, live woody moisture was 125% to 150%.

6. Mean number of prescription days in August from Jay Point weather data for wind speeds (adjusted for site for each ignition point) and 1 hour fuel moisture, from RXWTHR co-occurence table are:

20 ft. wind	Midflame wind			Days 1 hour fuel moistures			Total days
	Ig. 1	Ig. 2	Ig. 3	4%	8%	12%	
<3	0	0	0	0	1	1	2
3-5	1	2	1	0	1	1	2
6-8	2	3	2	1[1]	2	1	4
9-11	3	4	2	0	3	1	4
12-14	4	6	3	0	2	1	3
15-17	5	7	3	0	1[2]	0	1
18+	6	8	4	0	1[2]	0	1
		Total days		1	11	5	17

[1] Assumed fires ignited on this day, 1 hour fuel = 4%, 20 ft. wind = 8 mph.

[2] These two days were deleted from Ignition 3 in fire size calculations.

APPENDIX 4. Co-occurence table from RXWTHR for Jay Point Lookout.

WIND SPEED - 1 HR FUEL MOISTURE

PERCENT FREQUENCY OF CO-OCCURRENCE
GIVEN TO TENTHS PERCENT

JAY POINT LO (101021) 1961-1975

JAY POINT: ASPECT=SOUTH, ELEVATION= 4000, CANOPY=OPEN

** AUG **

1 HR FUEL MOISTURE %

SPD MPH	BELOW 4	4 TO 7	8 TO 11	12 TO 15	16 TO 19	20 TO 23	24 TO 27	28 TO 31	32 TO 35	36 AND ABOVE	TOTAL
LT 3		.2	4.2	3.0	1.9	.5	1.9	.7			12.3
3 - 5		.7	6.3	3.5	.9	.7	1.2				13.2
6 - 8		1.2	10.2	5.1	2.1	.5	.5	.2	.2		19.9
9 - 11		.9	14.8	3.7	.5	.7	.9				21.5
12 - 14		.7	10.2	3.7	.5	.2	.9				16.2
15 - 17		.2	6.3	1.4	.5		.2	.2			8.8
18 - 20			3.7	1.2			.2				5.1
21 - 23			.9	.2							1.2
24 - 27			.7		.2		.7				1.6
GE 28			.2								.2
TOTAL	.0	3.9	57.4	21.3	6.5	2.5	6.5	1.2	.2	.0	100.0

NUMBER OF DAYS 432

** SEP **

1 HR FUEL MOISTURE %

SPD MPH	BELOW 4	4 TO 7	8 TO 11	12 TO 15	16 TO 19	20 TO 23	24 TO 27	28 TO 31	32 TO 35	36 AND ABOVE	TOTAL
LT 3			3.5	6.1	.9	.9	1.7				13.0
3 - 5		.9	2.6	1.7	.9		3.5				9.6
6 - 8			14.8	7.0	2.6	.9	2.6	.9			28.7
9 - 11			9.6	6.1		1.7	2.6				20.0
12 - 14		.9	7.8	2.6	.9		2.6	1.7			16.5
15 - 17			7.8				.9				8.7
18 - 20			1.7								1.7
21 - 23			1.7								1.7
24 - 27											.0
GE 28											.0
TOTAL	.0	1.7	49.6	23.5	5.2	3.5	13.9	2.6	.0	.0	100.0

NUMBER OF DAYS 115

APPENDIX 5. ERC frequency distributions from FIRDAT.

1978 NFDRS VERSION FFY 2.3 FREQUENCY DISTRIBUTIONS 22 FEB. 87 PAGE 35
T.RICH POWELL RANGER DIST 101031 ELEVATION- 3409 LATITUDE-46
MODEL-G SLOPE CLASS-4 HERB TYPE-P CLIMATE CLASS-3 FIRE SEASON- 1/ 1 TO 12/31

ENERGY RELEASE TOTAL NO OF DAYS 5017 NO OF CLASSES 19 STEP SIZE 4

CLASS NO.	UPPER BOUNDARY	FREQUENCY	RELATIVE FREQ	CUMULATIVE FREQ	
					90.%= 44.97
					97.%= 53.73
1	0	212	4.2	4.2	
2	4	125	2.5	6.7	
3	8	152	3.0	9.7	
4	12	249	5.0	14.7	
5	16	450	9.0	23.7	
6	20	527	10.5	34.2	
7	24	573	11.4	45.6	
8	28	571	11.4	57.0	
9	32	525	10.5	67.5	
10	36	454	9.0	76.5	
11	40	352	7.0	83.5	
12	44	270	5.4	88.9	
13	48	229	4.6	93.5	
14	52	148	2.9	96.4	
15	56	63	1.4	97.8	
16	60	55	1.1	98.9	
17	64	37	.7	99.6	
18	68	13	.4	100.0	
19	72	1	.0	100.0	

1954 – 1986 GREEN-UP: 5-15 FREEZE: 9-15

Appendix 6. Fire size estimates using fire size and fireline intensity conditional probabilities.

On February 20, Gary Meyer, Larry Keown, Dave Thomas, Dan Davis, Dick Kramer, and Tim Rich met to game fire size estimates for the Point Source Burn Plan. The process used was simply conditional probabilities based on various fireline intensities by FBO fuel model and fire size probabilities. Consensus opinion of all members of the group was used to determine possible fire sizes at different fireline intensity levels, and the associated probabilities of achieving the possible fire sizes.

Three members of the team, Keown, Thomas and Meyer, are qualified FBA's. Rich has a background in fire behavior, and Davis and Kramer have had little formal fire behavior training. We felt this would give the group some balance.

Assumptions

1. Program RXWTHR was used to get average BI for August for Powell Ranger Station (1954-1986). This was divided into classes, and relative frequencies of occurence for each class was used for probabilities. BI classes were converted to fireline intensity classes using the nomograph from Albini (1976). Fireline intensity classes and probabilities were determined for Fuel Models G and H, which are representative of the ignition areas.

2. We took one ignition at a time. Fire behavior from one fire had no influence on fire behavior of another.

3. One fuel model was representative of the entire fire for fireline intensity probabilities.

4. The initial ignition was a sustained fire no larger than a quarter acre.

5. When considering fire sizes at each intensity level, we assumed this condition would be sustained through August.

Results

Total expected acres from the three ignitions totaled 1520. Care must be taken in interpretation. If this scenerio was repeated on the ground over time, we could expect that 1520 acres would burn annually, on the average. This should be viewed as an average maximum, as the upper levels of the acreage size classes were used in the calculations.

It is interesting to note that the team could not envision a fire larger than 2000 acres occuring from Ignition Source 1, and fires no larger than 3000 acres each from Ignitions 2 or 3. Highest probability of fire size estimates in the higher intensity levels were from 500 to 1000 acres, and less than 100 acres in the lower intensity levels. Ignition 1 was an exception--larger fire sizes were thought possible even in the lower intensity levels, which is consistent with fire behavior estimates using FBO techniques.

FIRE NUMBER	FIRELINE INTENSITY PROBABILITIES[1]	SPOTTING PROBABILITIES	FIRE SIZE PROBABILITIES	AVERAGE FIRE SIZES	EXPECTED FIRE SIZES
1	0.0 / 500 +				
	.003 / 100 - 500		.04	2000	.24
			.16	1000	.48
			.70	500	1.05
			.10	100	.03
			0	0	0
	.997 / <100		.02	2000	39.88
			.23	1000	229.31
			.55	500	274.18
			.20	100	19.94
			0	0	0

TOTAL EXPECTED ACRES:

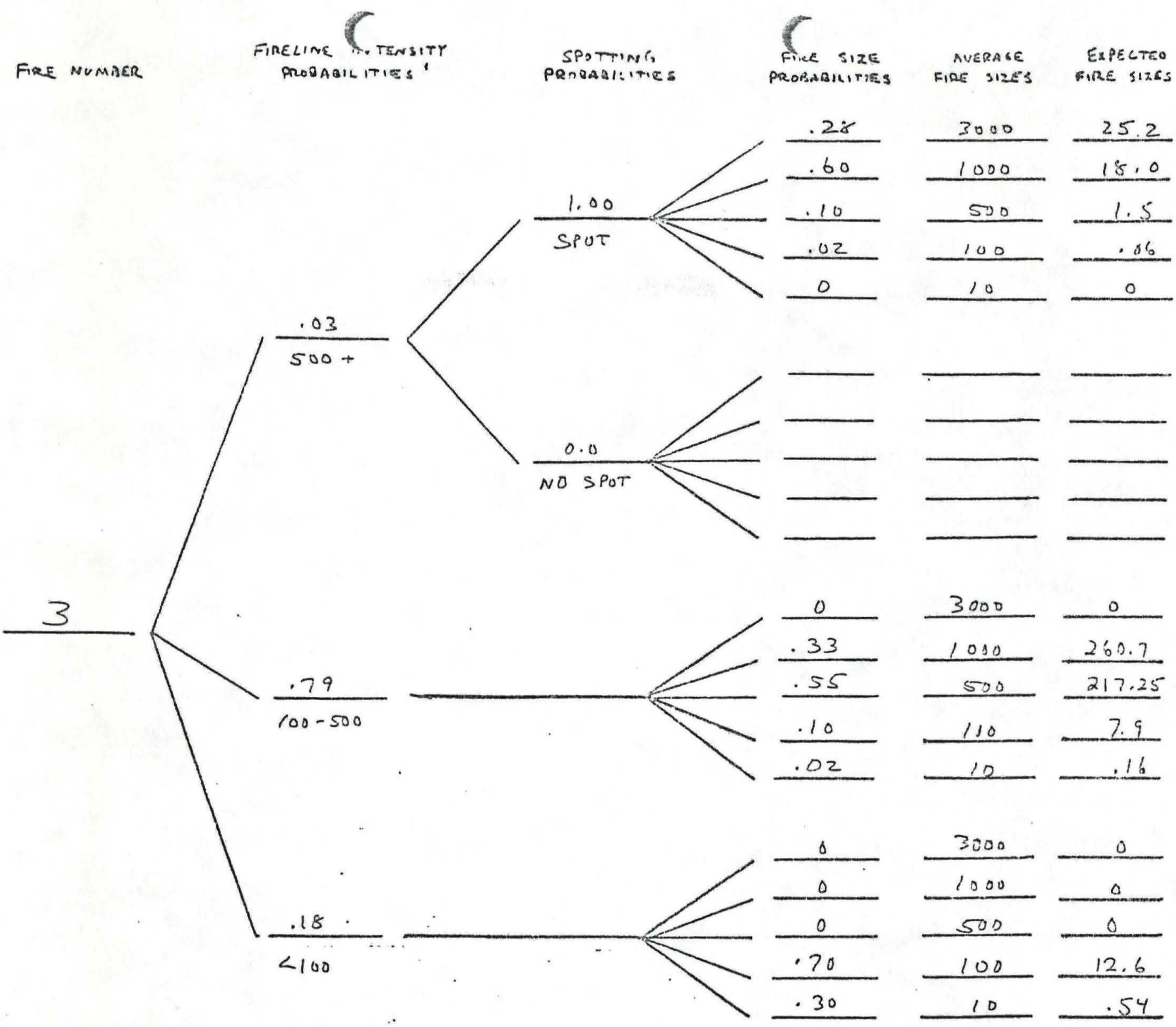
565.11

[1] BASED ON BI FOR POWELL 1954-1986, CONVERTED TO FIRELINE INTENSITY CLASSES, FUEL MODEL H. AUGUST DATA ONLY.

FIRE NUMBER	FIRELINE INTENSITY PROBABILITIES[1]	SPOTTING PROBABILITIES	FIRE SIZE PROBABILITIES	AVERAGE FIRE SIZES	EXPECTED FIRE SIZES
2	.03 500 +	1.00 SPOT	.19	3000	17.1
			.50	1000	15.0
			.30	500	4.5
			.01	100	.03
			0	10	0
		0.0 NO SPOT			
	.79 100-500		.01	3000	23.7
			.10	1000	79.0
			.60	500	237
			.28	100	22.12
			.01	10	.079
	.18 <100		0	3000	0
			0	1000	0
			.01	500	.9
			.60	100	10.8
			.39	10	.70

TOTAL EXPECTED ACRES = 410.93

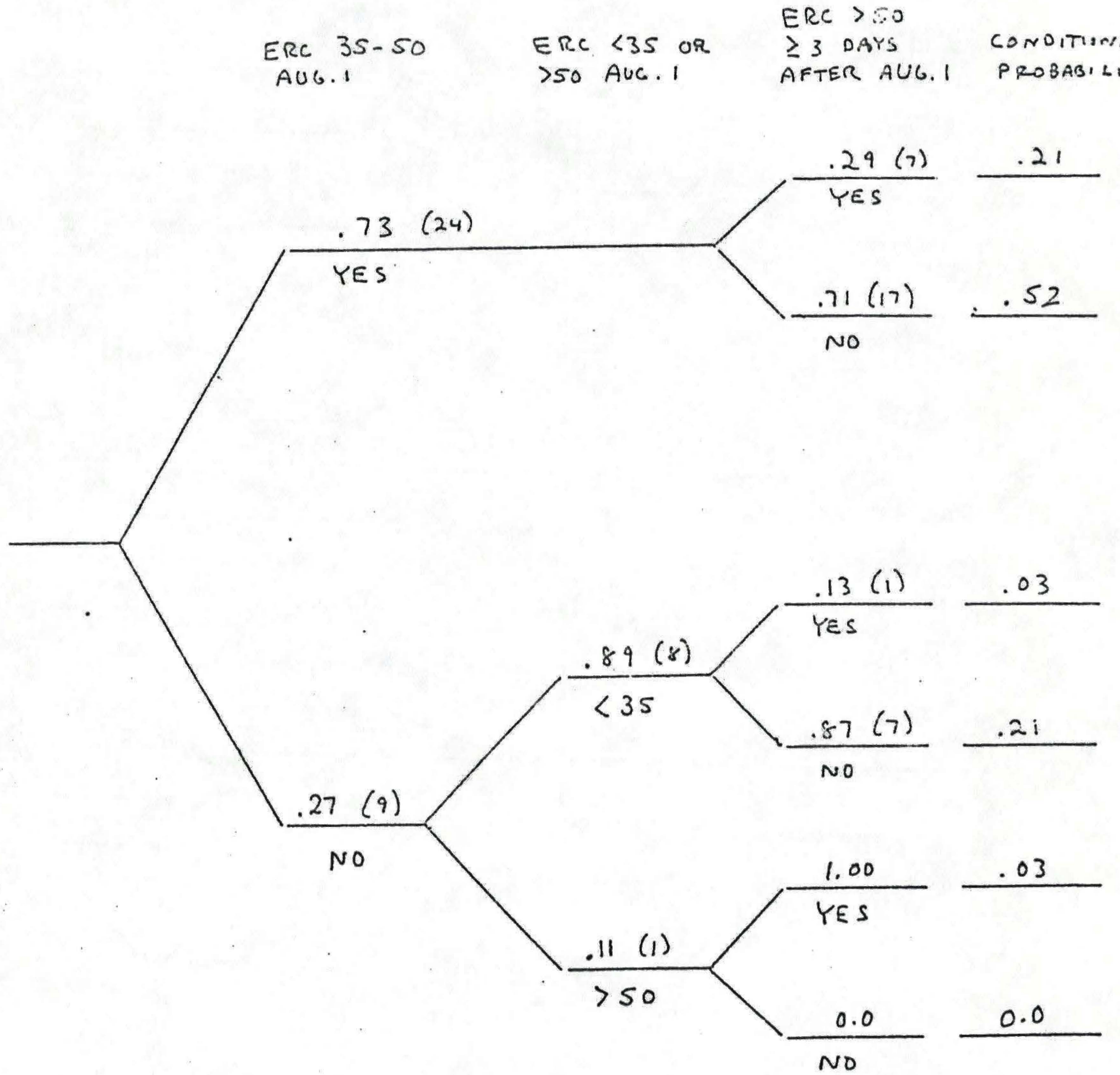
[1] BASED ON BI FOR POWELL 1954-1986, CONVERTED TO FIRELINE INTENSITY CLASSES, FUEL MODEL G. AUGUST DATA ONLY.



TOTAL EXPECTED ACRES = 543.91

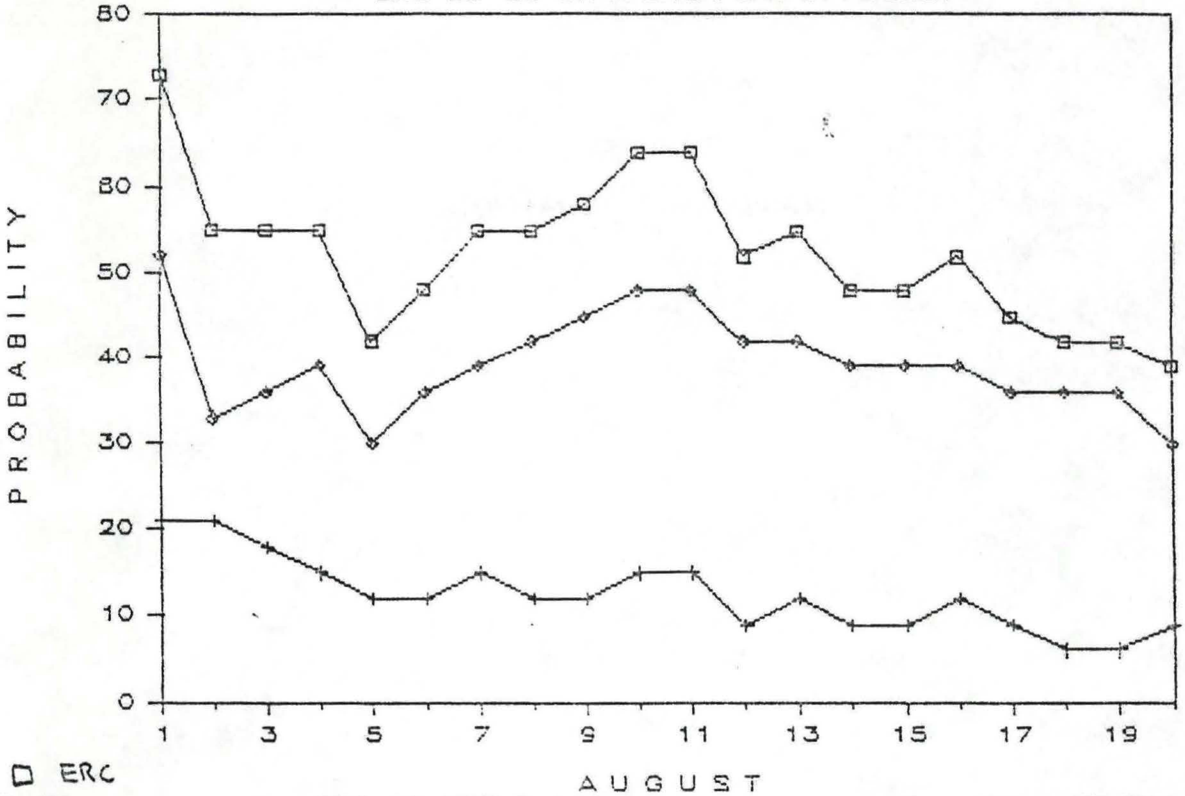
[1] BASED ON BI FOR POWELL 1954–1986, CONVERTED TO FIRELINE INTENSITY CLASSES. FUEL MODEL G. AUGUST DATA ONLY.

Appendix 7. Decision Tree for August 1 conditional probabilities, acceptable prescriptions. The numbers in () are actual years.



POWELL CONDITIONAL PROBS, 1954–1986

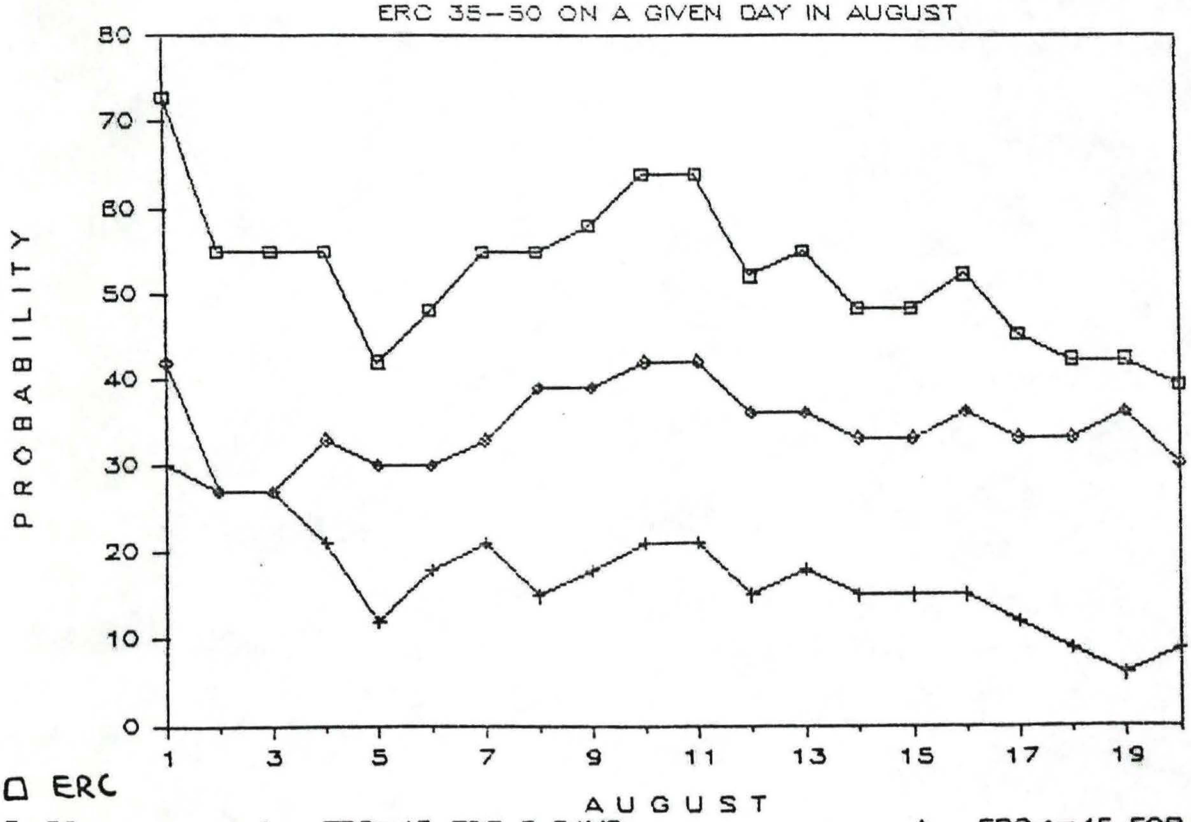
ERC 35–50 ON A GIVEN DAY IN AUGUST



□ ERC 35–50 + ERC>50 FOR 3 DAYS ◇ ERC<=50 FOR 3 DAYS

POWELL CONDITIONAL PROBS, 1954–1986

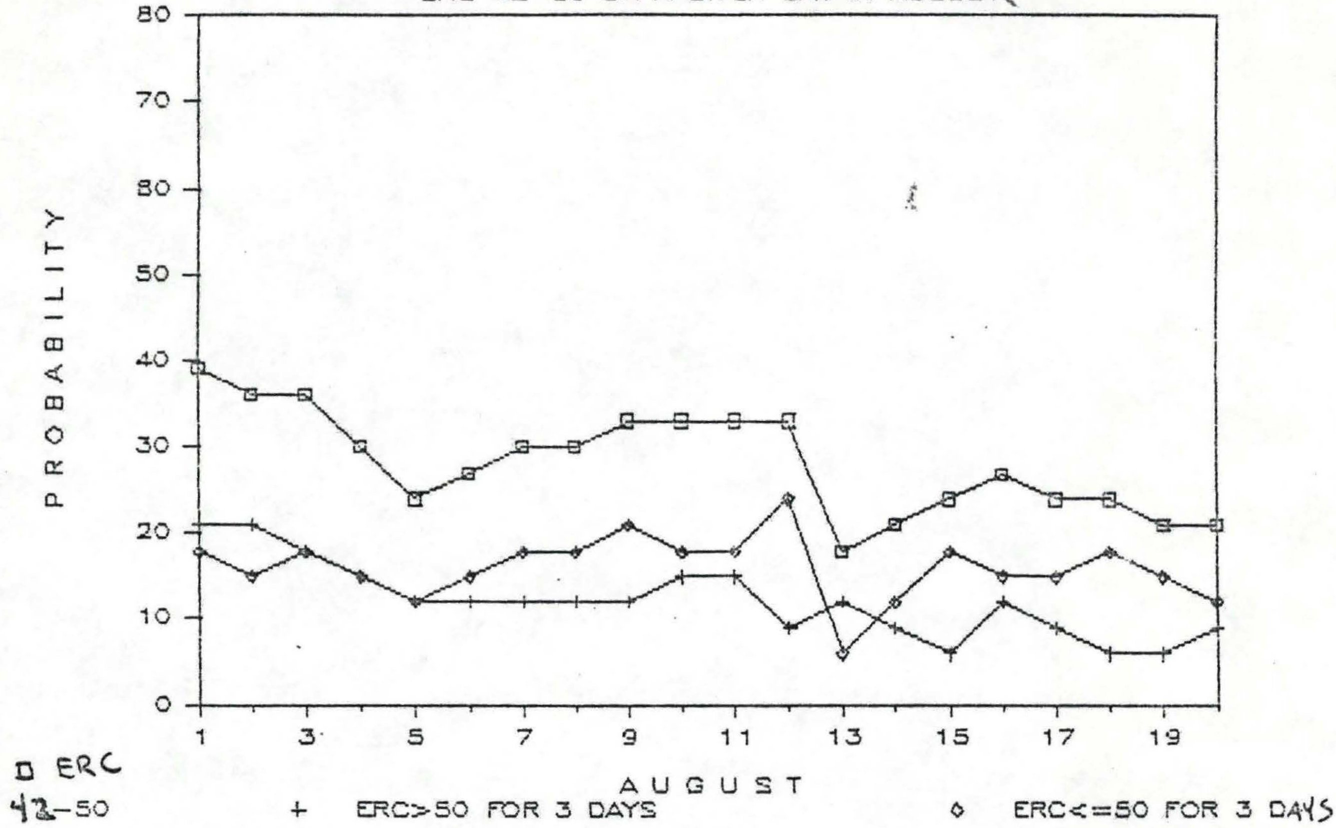
ERC 35–50 ON A GIVEN DAY IN AUGUST



□ ERC 35–50 + ERC>45 FOR 8 DAYS ◇ ERC<=45 FOR 8 DAYS

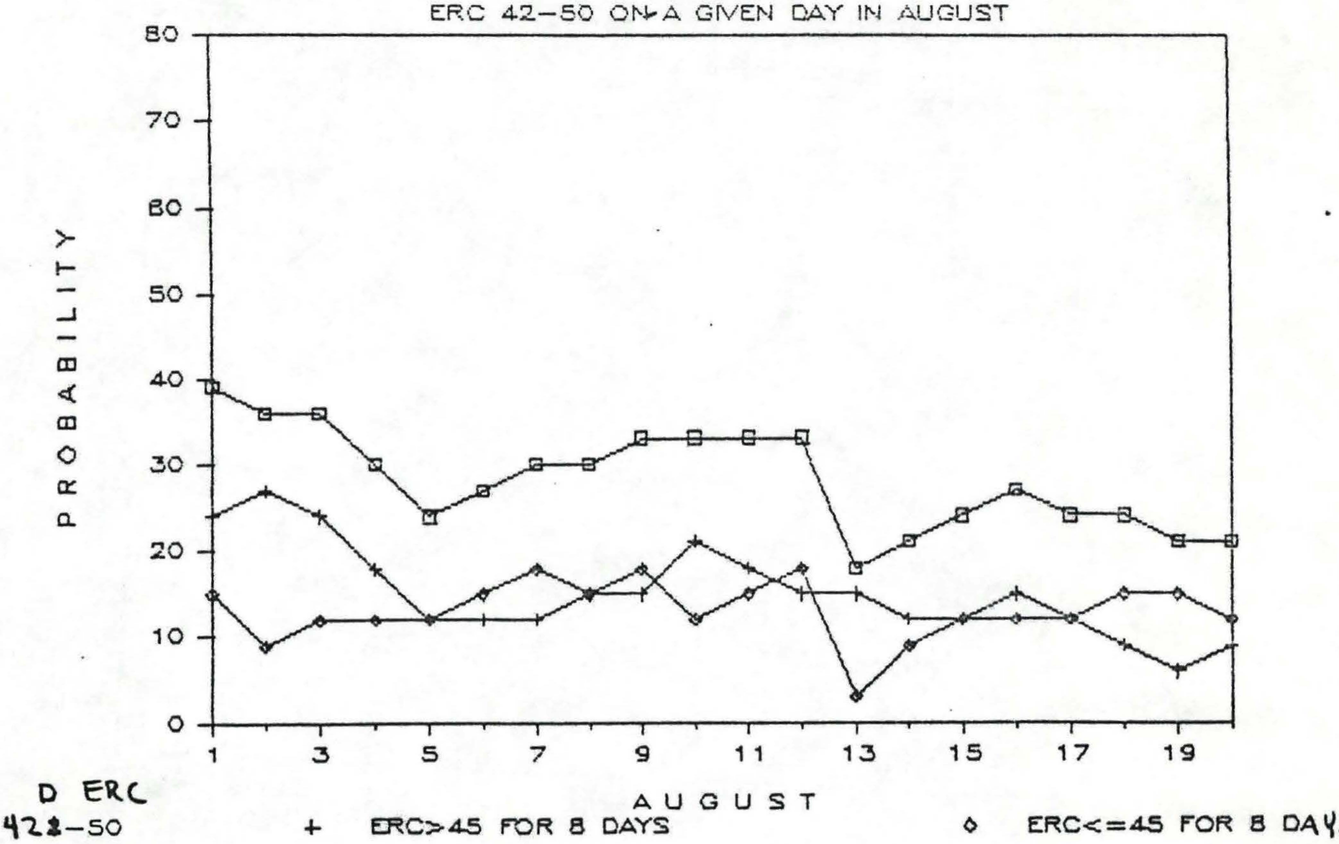
POWELL CONDITIONAL PROBS, 1954–1986

ERC 42–50 ON A GIVEN DAY IN AUGUST



POWELL CONDITIONAL PROBS, 1954–198

ERC 42–50 ON A GIVEN DAY IN AUGUST



APPENDIX 8.

Lochsa Face Fire Prescriptions - Initial Analysis

Clearwater National Forest

Powell Ranger District

Submitted By

Larry S. Bradshaw

Research Meteorologist

Systems for Environmental Management

December 15, 1986

Draft

Introduction

The Lochsa Face Fire Management problem encompasses many aspects of multiple use management: it borders designated wilderness on its southern border; the heavily recreated Lochsa River and busy U.S. Highway 12 on the north; and timber demands to the east and west. It comprises more than 26,000 acres-- mostly steep broken terrain with predominately northern aspects. Most of the area burned in 1927 and is now an even aged densely forested complex. The area is roadless and the current management emphasis is on wildlife habitat.

The fire management plan for this area is to use fire to enhance wildlife, particularly big game, habitat. A hot fire would greatly enhance wildlife browsing conditions-- a whimpy smoldering fire will not remove the doghair conditions that have developed during the last sixty years. The fire that will allow this area meet its management objectives is going to make some people nervous. In that light, good information will be critical when making the decision of which natural ignition(s) to let burn, or, more daring, when and how to ignite a fire that will most closely simulate a natural lightning ignition.

This draft report briefly summarizes the recent fire history, fire weather, and prescribed fire opportunities for the Lochsa Face Management Area.

Recent Fire History

In the past seventeen years (1970-1986), eleven fires have been documented in the management area. Each fire was contained within 24 hours of initial attack and the total acres burned by these 11 fire is zero. Three of the four person caused fires started along the Lochsa River, and the two October fires started on the same day, most probably by hunters. Table 1 shows the seasonal and yearly distribution of fire starts in the management area.

Table 1. Fires in the Lochsa Face Area, 1970 - 1985

Period	Lightning	Person	Year(s)
Jul 1 - 10	0	1	78
Jul 11 - 20	1	1	78, 76
Jul 21 - 31	1	0	76
Aug 1 - 10	3	0	73,73,76
Aug 11 - 20	0	0	
Aug 21 - 31	1	0	82
Sep 1 - 10	1	0	78
Sep 11 - 20	0	0	
Sep 21 - 30	0	0	
Oct 1 - 10	0	0	
Oct 10 - 20	0	2	79
	7	4	

Fire Weather

There are two weather stations that have archived weather observations (Furman and Brink, 1975) near the Lochsa Face Management Area: Powell Ranger Station located along the Lochsa River (elev. 3409), and Jay Point Lookout (elev. 5438). Powell, the primary station has good records from 1954 through 1986. The second station, Jay Point has records from 1960 until its closure in 1975. Energy release component (ERC) and Burning Index (BI) from the 1978 National Fire Danger Rating System (Deeming and others, 1977) are commonly used to evaluate fire danger and potential severity of fire behavior on the Powell District. Minimum relative humidity, 10, and 1000 hour fuel moisture are additional parameters used to monitor potential fire situations. The Lochsa Face area may be described by Fuel Model G (Timber with Understory) and a slope class of 4. We used FIRDAT (Main and others, 1982) to generate fire weather/fire danger climatologies for the two stations. The past 17 years (1070-1986) has seen four years which are considered, severe fire weather years: 1973, 1979, 1981, and 1985. Table 2 tabulates ERC, BI, 10, and 1000 hour fuel moisture at 3 percentile levels commonly used in fire

planning (the 80th, 90th, and 97th). Values are given first for the 17 year period from 1970-86, and then separately for 1973, 1979, 1981, and 1985 at Powell.

Table 2. Values of Four Indices at Three Percentile Levels At Powell for a 17 Year Average and Four Selected Severe Fire Weather Years From FIRDAT: Fuel Model G, Slope Class 4, Perennial Grasses

Percentile	Index	1970-86	1973	1979	1981	1985	Deviation From Avg.
80th	ERC	35	43	37	38	41	5
90th		39	47	41	40	45	4
97th		46	51	43	43	49	1
80th	BI	44	54	47	43	52	5
90th		50	60	52	47	54	3
97th		58	67	55	50	58	-1
80th	10 Hour Dead FM	9	6	11	8	8	-1
90th		7	5	10	7	6	0
97th		4	4	10	5	6	2
80th	1000 Hour Dead FM	16	15	14	15	15	-1
90th		14	13	14	14	13	-1
97th		13	13	13	14	13	0

The last column in table 2 is the mean deviation from the 17 year average by the four severe fire years. The larger differences at the 80th and 90th percentile levels of ERC (5 and 4) and BI (5 and 3) indicate that severe years tend to consist of many days of above 'normal' values at the middle-upper percentiles, as opposed to many 'extreme' values days over 97th percentile values. Fuel moisture values appear to be less indicative of differences in years. At the 80th percentile level, severe year 10 and 1000 hour fuel moistures averaged just one percent below the 17 year 80th percentile level.

Using 10 day period mean values, figure 1 illustrates Powell's ERC severe year departure from normal using a longer term (33 year) normal. Note in figure 1

that severe year departures from normal peak in middle and late July. Bringing Jay Point into the picture, figure 2 shows the 33 and 16 year average values of ERC at Powell and Jay Point, respectively. Buildup at the higher elevation station lags behind the valley station by about three weeks, but peaks at higher values despite cooler average maximum temperatures (figure 3) and higher minimum relative humidities (figure 4). The minimum humidity values may be misleading, particulary at Jay Point, because they are mostly estimated. Observed humidity (figure 5) and wind speed (figure 6) are probably more responsible for the late season peaks at higher elevations. It must be remembered that neither of these weather stations is in the Lochsa Face Area -- Powell is in the river valley, and Jay Point is on an exposed mountain point, while the face area encompasses and northern slope of middle elevations. These summaries should only be viewed as boundary conditions.

Burning Prescriptions

We based burning prescriptions on ERC and minimum relative humidity. ERC was selected because it best integrates all the parameters of fire weather -- wind, temperature, humidity, and condition of both large and live fuels. Also, it is a seasonally tracked index at Powell. Minimum relative humidity was included because it indicates the condition of fine fuels during the most active burning period. A burning prescription was established and program RXBURN (Bradshaw and Fischer, 1981) charted the patterns of occurrence of favorable burning days. We used site adjustments to modify the standard weather observation to a closed canopy, north slope, elevation 4500 feet.

Since the Lochsa Face will require rather severe burning conditions, ERC was selected to be, at a minimum, the average value at the 80th percentile level (35) for all years (1970-86) plus the deviation at the 80th percentile level (5) for

the four severe years. We selected a maximum ERC of 60 (highest Powell ERC was 57) to define the upper limit of our acceptable prescription. For a preferred prescription, we added another deviation (5) to the minimum value (40) and selected 52 for a maximum ERC value. We then defined a 'hot end' prescription that had an ERC greater than 52, and minimum relative humidity of 20 percent or less. For Powell weather, adjusted to the Lochsa Face site (Fuel Model 3. Slope Class 4, north aspect, closed canopy, elev. 4500 ft), we analyzed the following prescription conditions for frequency and pattern of occurrence:

	Hot End		Preferred		Acceptable	
	Max	Min	Max	Min	Max	Min
ERC	52	100	45	52	40	60
Min. Humidity	0	20	20	30	10	30

We also used RXBURN on Jay Point data for preferred and acceptable prescriptions only. The general occurrence patterns are summarized in figures 7 and 8 for Powell, and figures 9 and 10 for Jay Point. Since Jay Point is no longer an operating station, the occurrence patterns are for information only, not for an operational procedure.

Powell averaged 11 acceptable burning days per season, 2 preferred burning days, and 1 hot prescription day per year. Figure 7 charts the probability of occurrence by 10 day period, and figure 8 shows, from a given 10 day period, the number of days likely to be in prescription, between that date and the end of the year.

At Jay Point, an average of 25 preferred burning days a year occurred, with the highest frequency (20%) the last week of August. Jay Point also averaged 42 acceptable burning days per year for its brief 17 year data set. This higher value is mostly a result of higher windspeeds at the exposed lookout location.

Summary

I make the following observations and recommendations for consideration for the development of your plan:

1. It is unlikely that you will get a natural ignition in the area that will meet your objectives. Almost any natural ignition occurring with current ERC less than 50 should be allowed to burn.
2. If you are going to provide the ignition, the time frame beginning the 11th of August is the prime time, provided you are in an acceptable prescription based on Powell ERC Values. At this time you have reached your peak ERC values, and can be fairly certain of 10 good burning days before burning conditions begin to falter.
3. Establish a remote weather station up in the area and develop exact correlations between conditions at Powell and the management area.
4. After you develop the burning plan, monitor it for at least a year before lighting a prescribed fire. Track the number of days you could have lit a fire and document the expected fire behavior following each 'ignition.' If you get a natural ignition during the monitoring period, allow it to burn if it is within prescription.

References

Bradshaw, Larry S.; Fischer, William C. A computer system for scheduling fire use. part 1: the system. General Technical Report INT-91. Ogden, UT: Department of Agriculture, Forest Service, Intermountain Research Station; 1981. 63 p.

Deeming, John E; Burgan, Robert E.; Cohen, Jack D. The National Fire Danger Rating System - 1978. General Technical Report INT-39, Ogden, UT: Department of Agriculture, Forest Service, Intermountain Research Station; 1977. 63 p.

Furman, R. William; Brink, Glen E. The National Fire Weather Library: what it is and how to use it. General Technical Report RM-19, Fort Collins, CO: Department of Agriculture, Forest Service, Rocky Mountain Research Station; 1975. 8 p.

Main, W. A.; Straub, R. J.; Paananen, D. M. FIREFAMILY: fire planning with historic weather data. General Technical Report NC-73. St. Paul, MN: Department of Agriculture, Forest Service, North Central Research Station; 1982. 31p.

FIG. 1

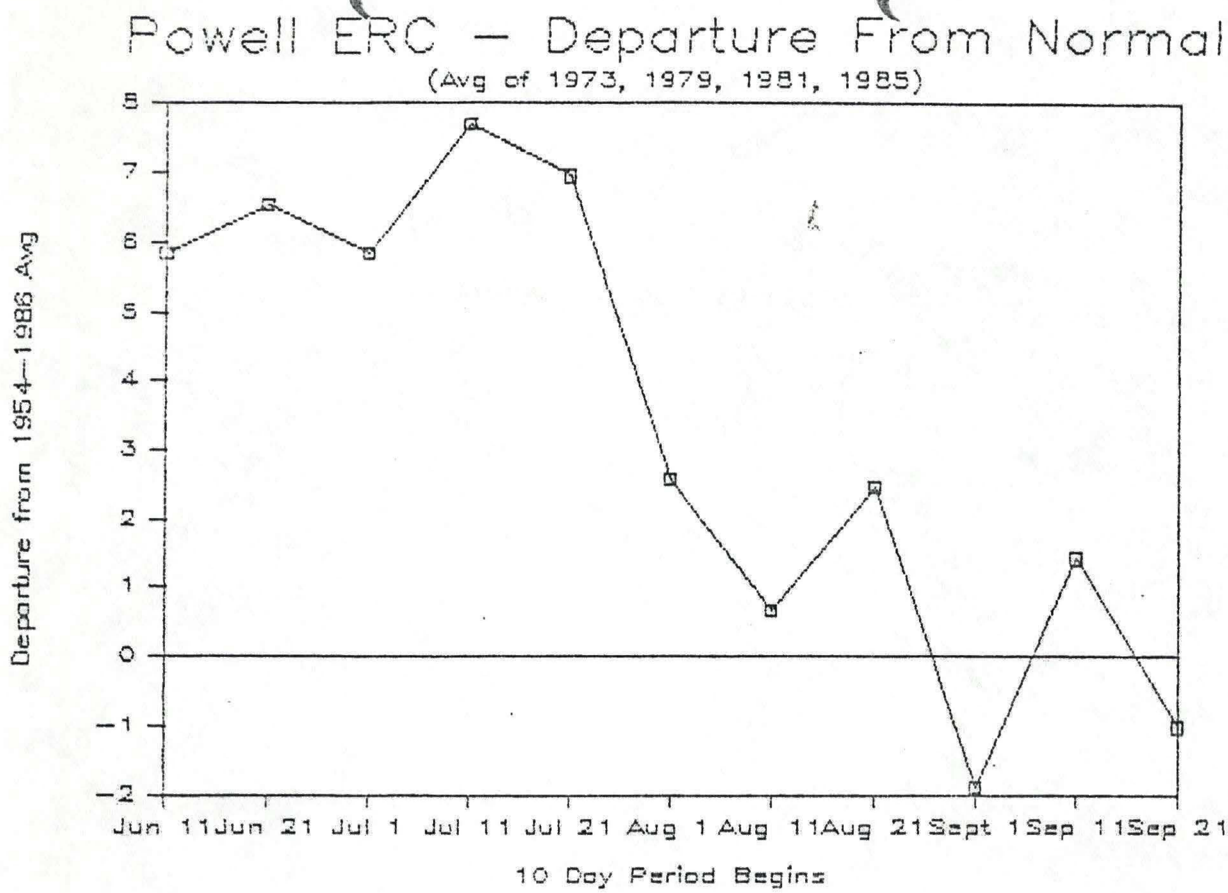

Powell ERC – Departure From Normal
(Avg of 1973, 1979, 1981, 1985)
Departure from 1954–1986 Avg
8
7
6
5
4
3
2
1
0
–1
–2
Jun 11
Jun 21
Jul 1
Jul 11
Jul 21
Aug 1
Aug 11
Aug 21
Sept 1
Sep 11
Sep 21
10 Day Period Begins

Fig. 2.

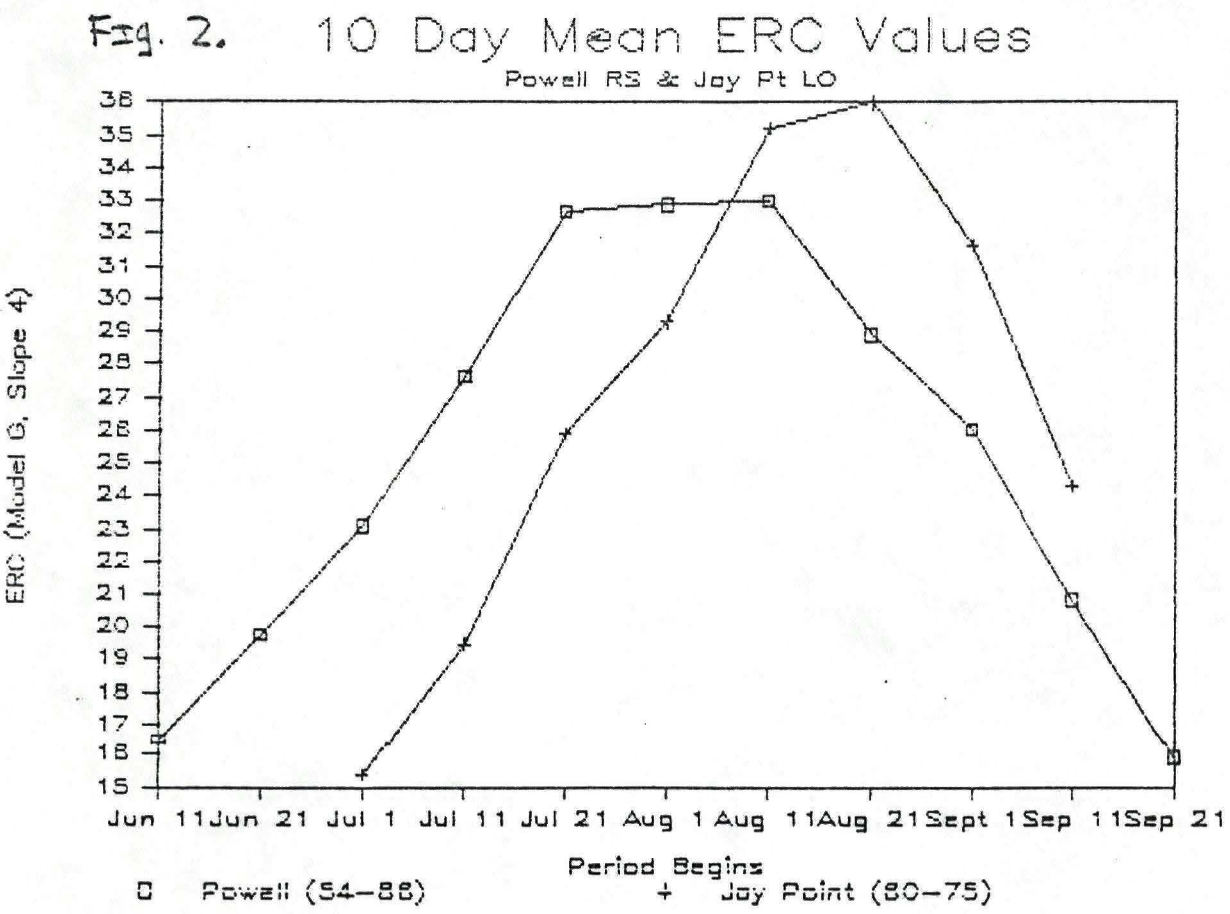

10 Day Mean ERC Values
Powell RS & Joy Pt LO
ERC (Model G, Slope 4)
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
Jun 11
Jun 21
Jul 1
Jul 11
Jul 21
Aug 1
Aug 11
Aug 21
Sept 1
Sep 11
Sep 21
Period Begins
□ Powell (54–88)
+ Joy Point (80–75)

Fig. 3.

Mean Maximum Daily Temperature

Powell RS & Joy Pt LO

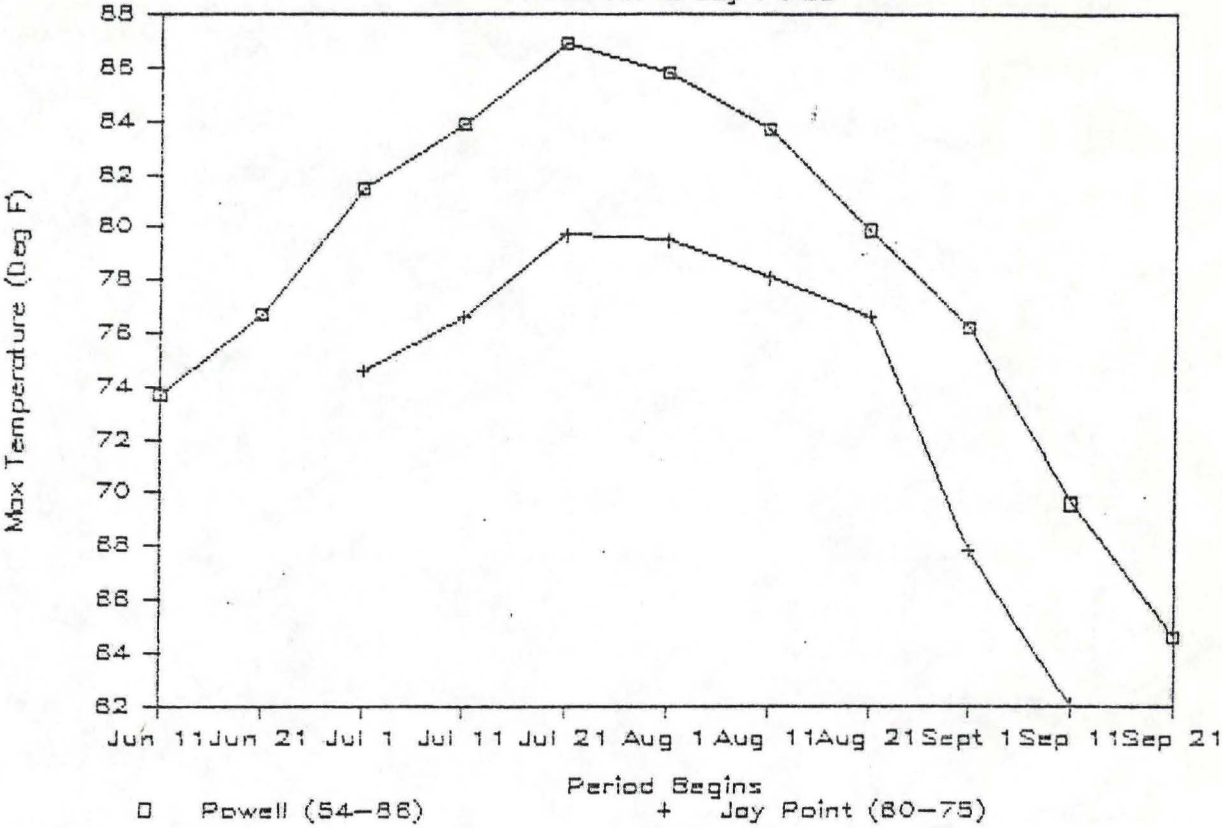


Fig. 4.

10 Day Mean Minimum Humidity

Powell RS & Joy Pt LO

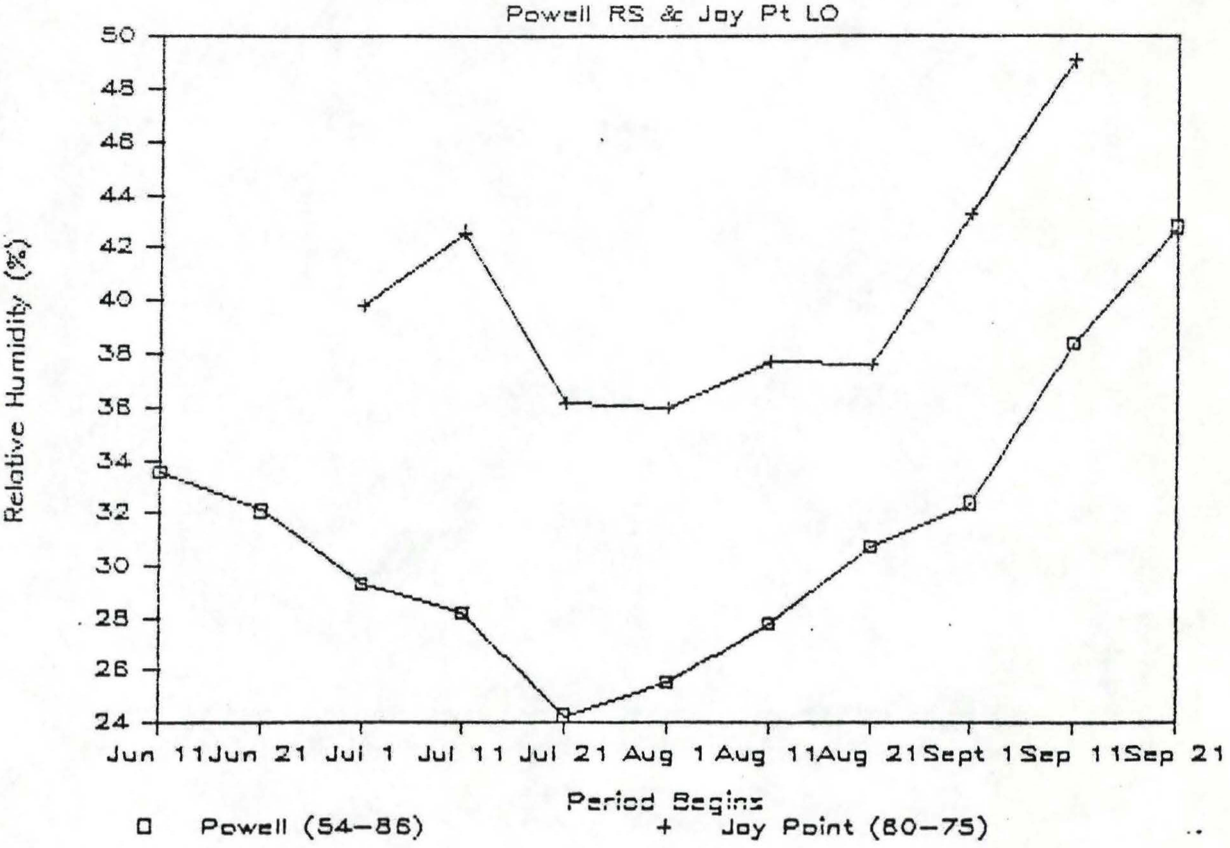


Fig 5.

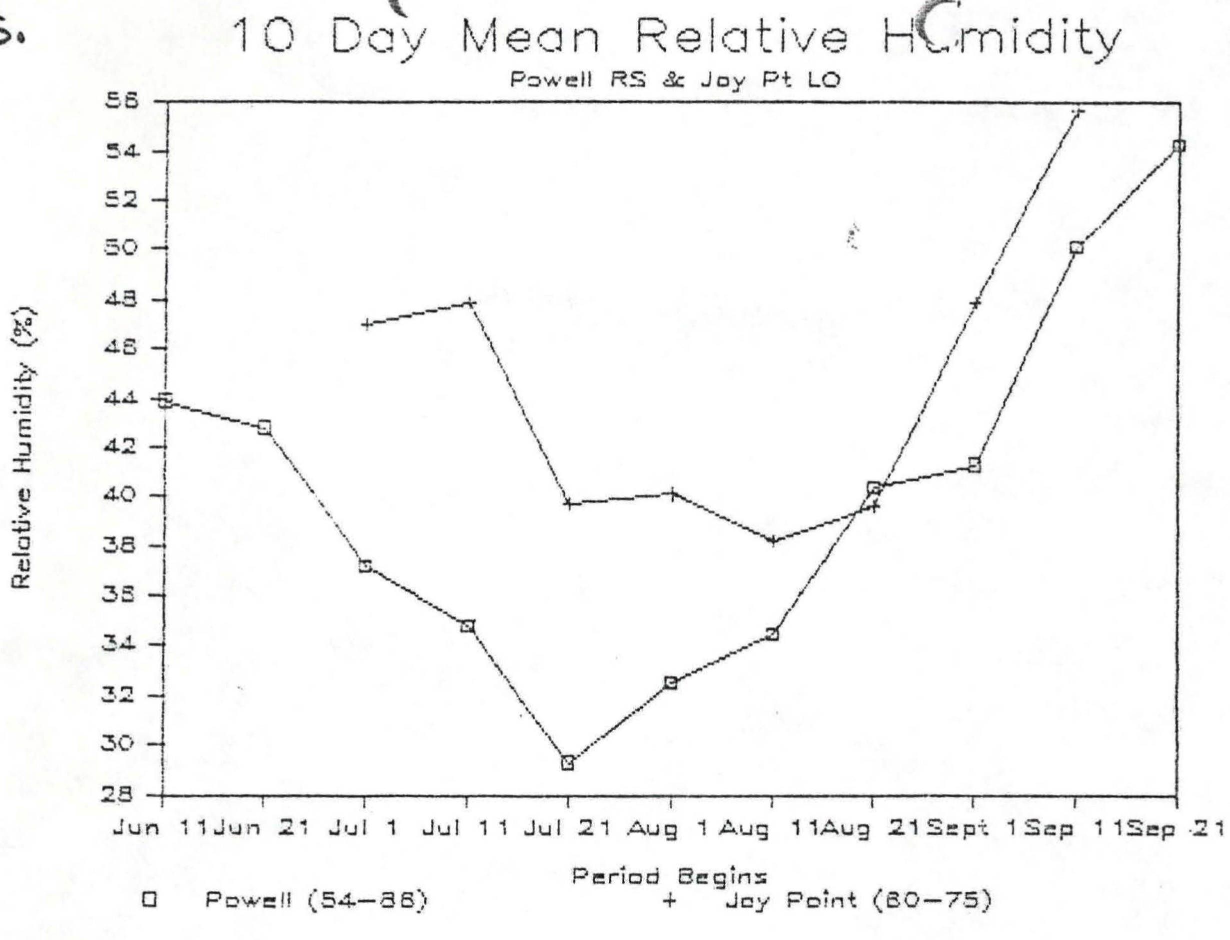

10 Day Mean Relative Humidity
Powell RS & Joy Pt LO
Relative Humidity (%)
56
54
52
50
48
46
44
42
40
38
36
34
32
30
28
Jun 11
Jun 21
Jul 1
Jul 11
Jul 21
Aug 1
Aug 11
Aug 21
Sept 1
Sep 11
Sep 21
Period Begins
Powell (54-88)
Joy Point (60-75)

Fig. 6.

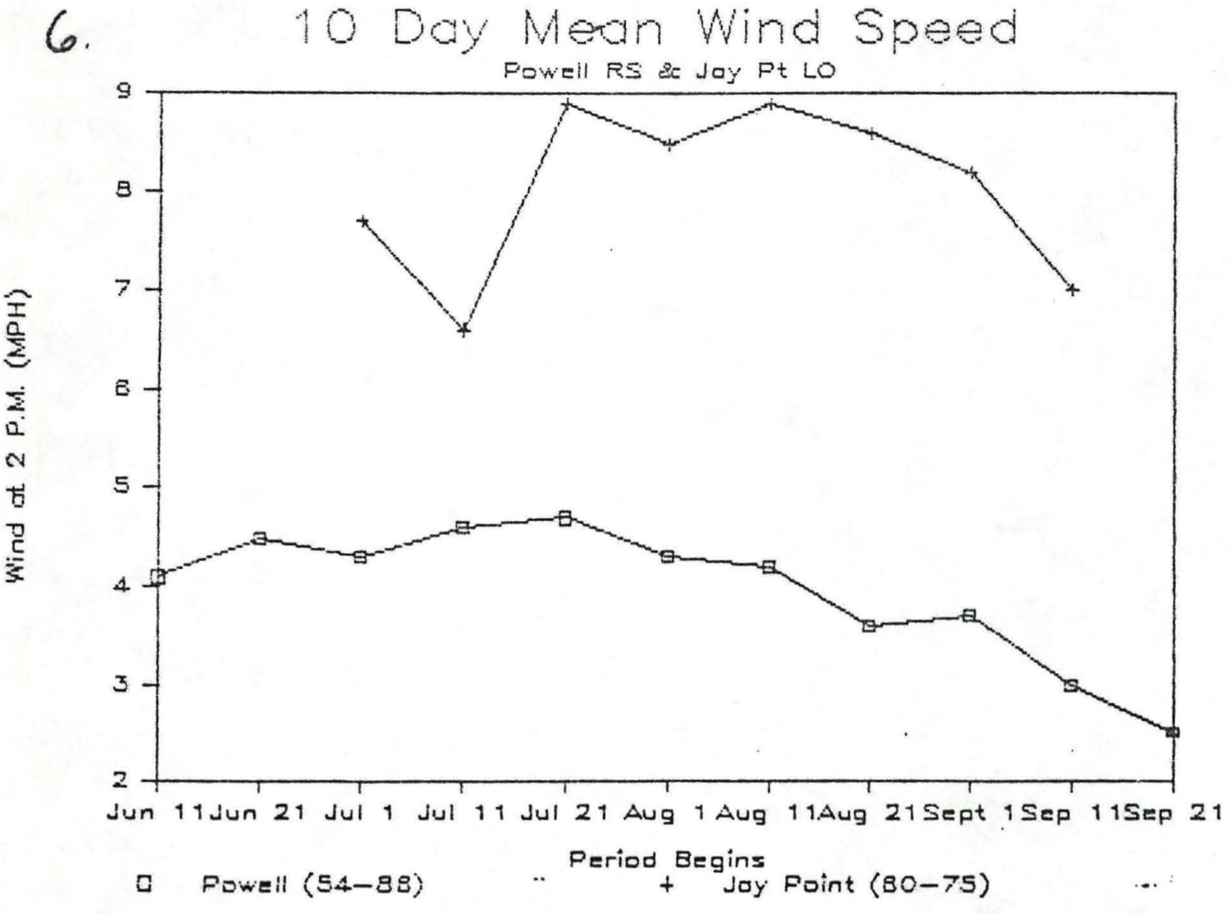

10 Day Mean Wind Speed
Powell RS & Joy Pt LO
Wind at 2 P.M. (MPH)
9
8
7
6
5
4
3
2
Jun 11
Jun 21
Jul 1
Jul 11
Jul 21
Aug 1
Aug 11
Aug 21
Sept 1
Sep 11
Sep 21
Period Begins
Powell (54-88)
Joy Point (60-75)

Fig. 7.

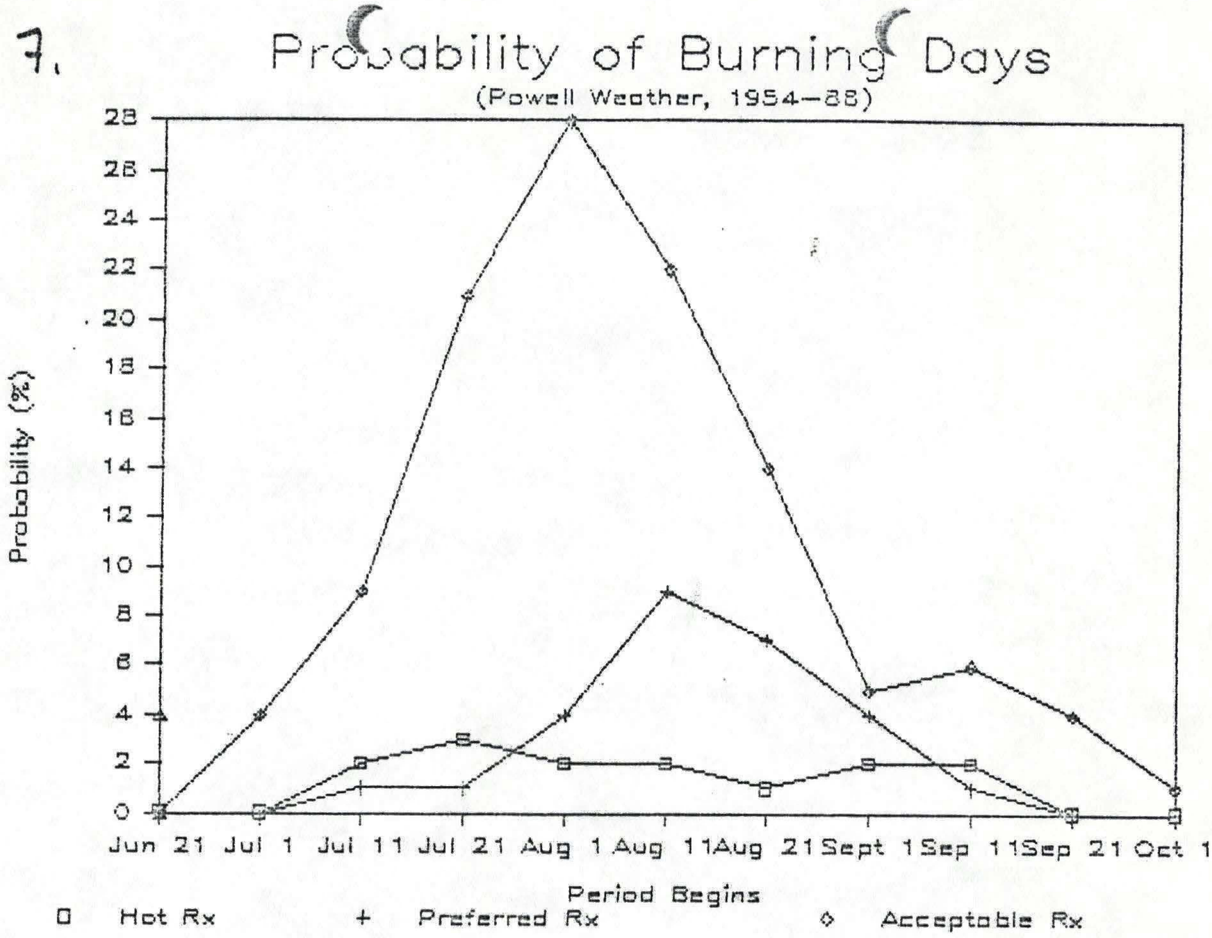

Probability of Burning Days
(Powell Weather, 1954–88)
Probability (%)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Jun 21 Jul 1 Jul 11 Jul 21 Aug 1 Aug 11 Aug 21 Sept 1 Sep 11 Sep 21 Oct 1
Period Begins
Hot Rx
Preferred Rx
Acceptable Rx

Fig 8,

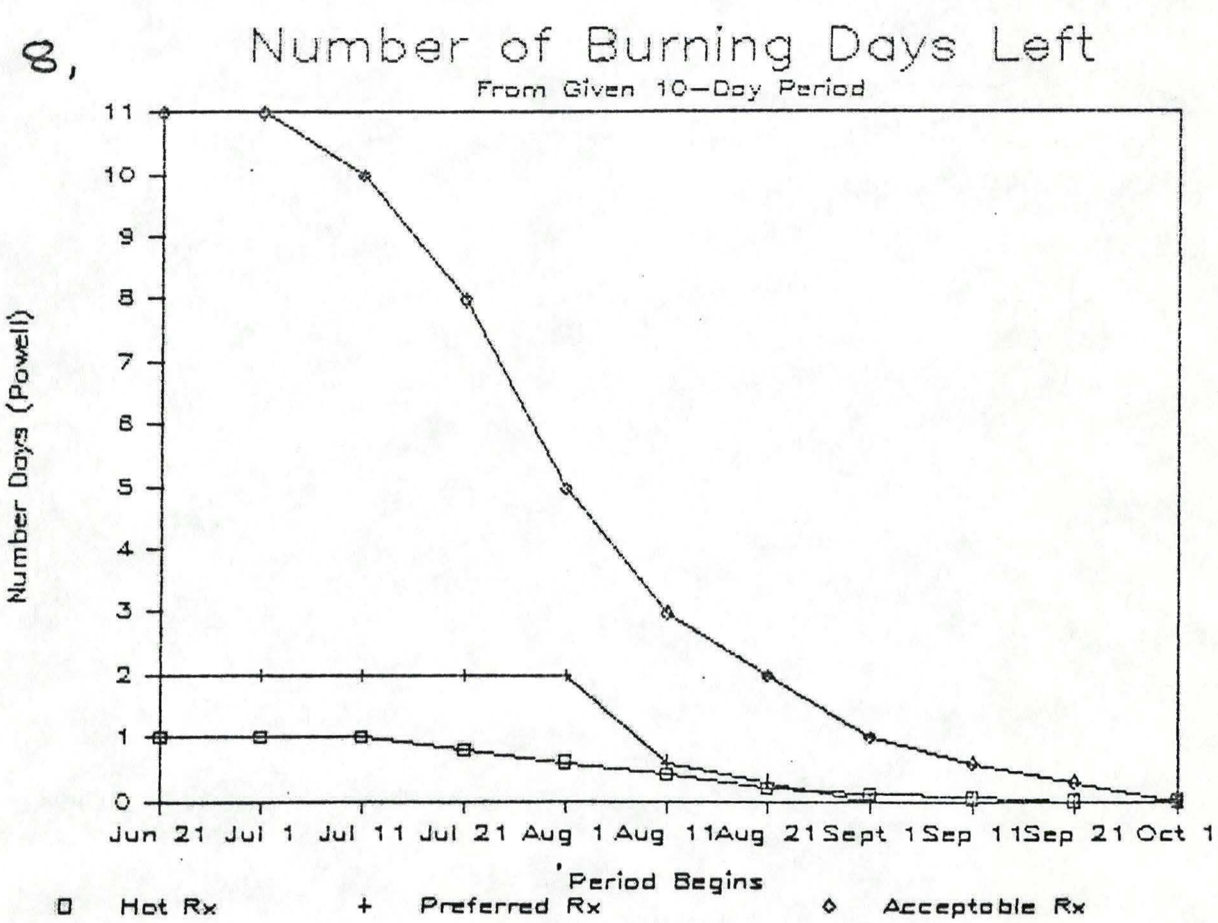
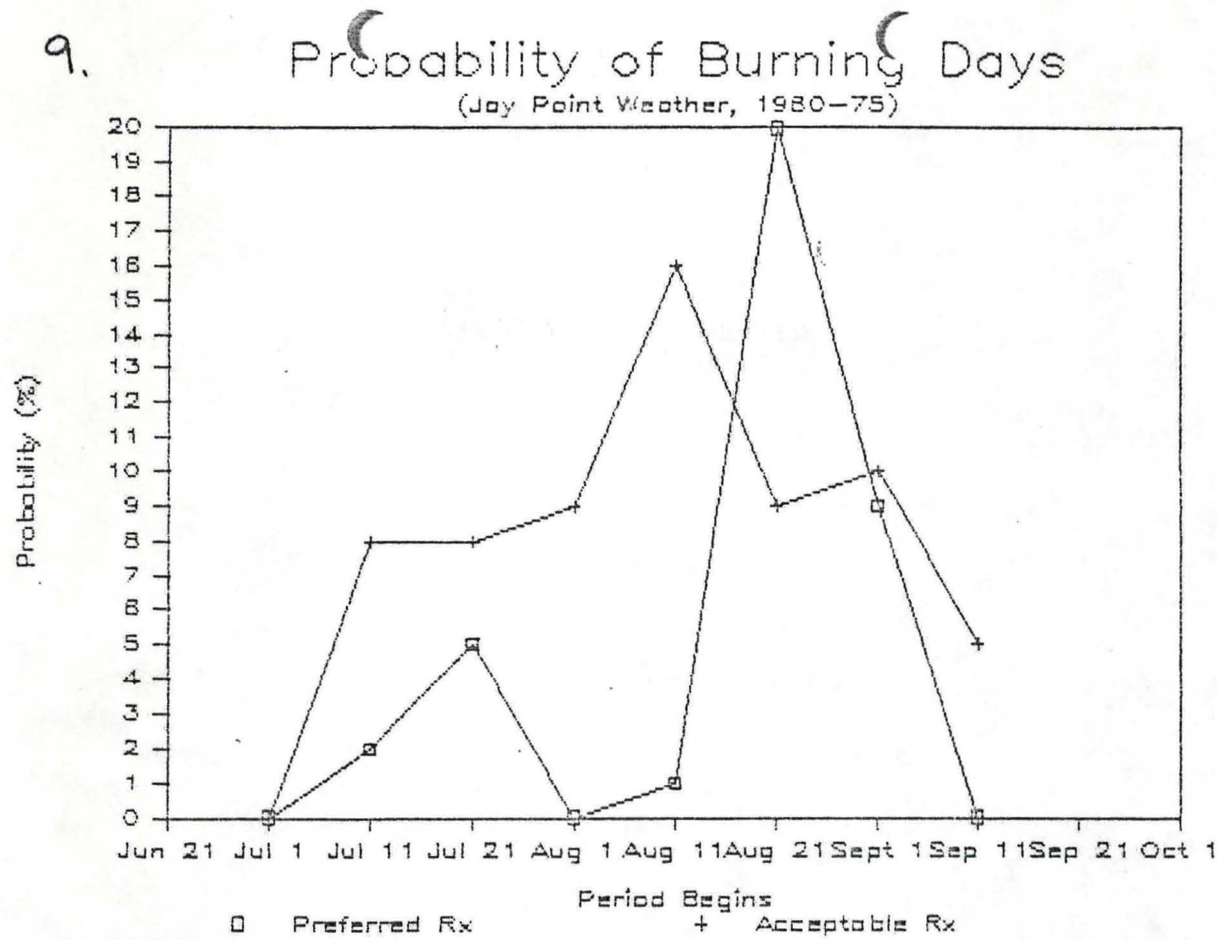
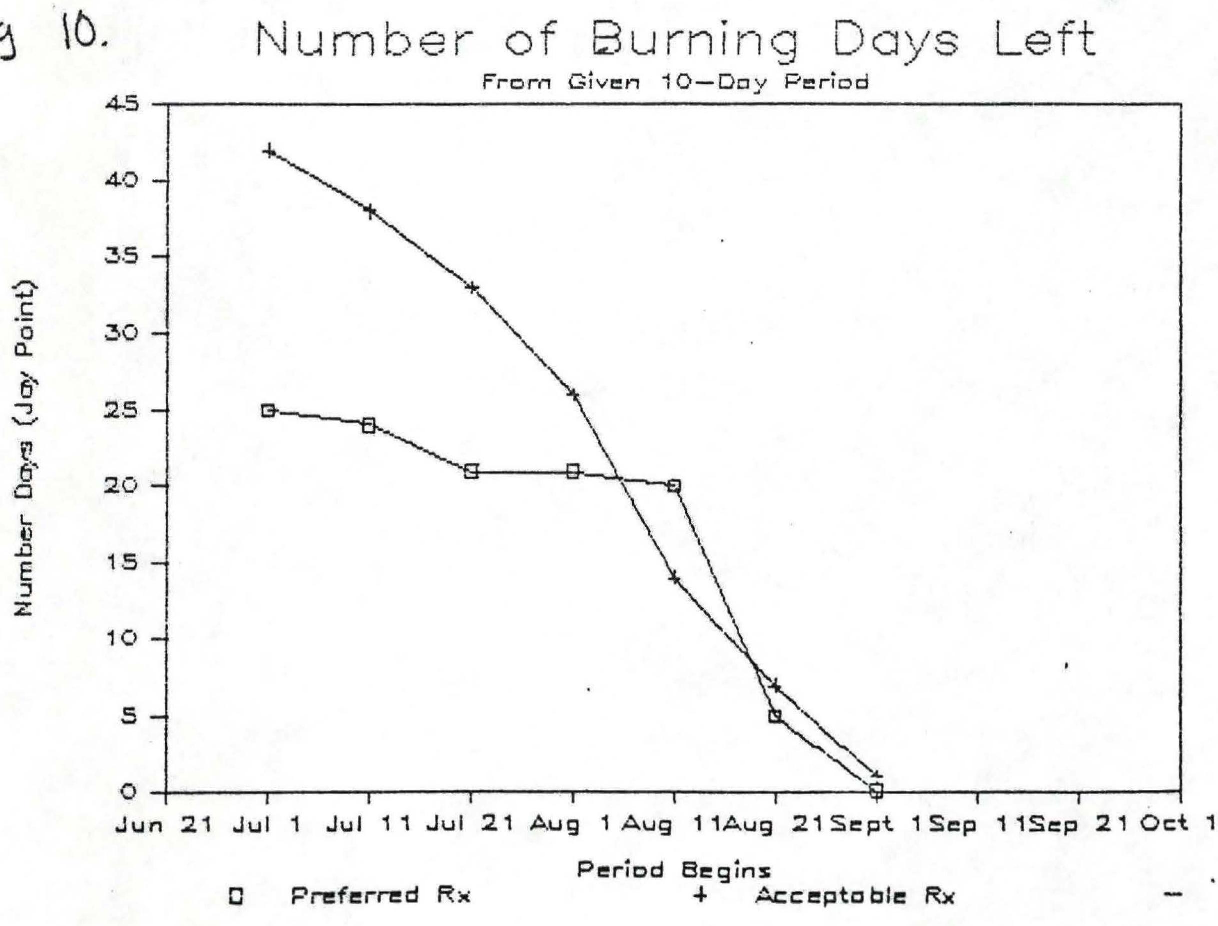

Number of Burning Days Left
From Given 10–Day Period
Number Days (Powell)
0
1
2
3
4
5
6
7
8
9
10
11
Jun 21 Jul 1 Jul 11 Jul 21 Aug 1 Aug 11 Aug 21 Sept 1 Sep 11 Sep 21 Oct 1
Period Begins
Hot Rx
Preferred Rx
Acceptable Rx

Fig. 9.



Probability of Burning Days
(Jay Point Weather, 1980–75)
Probability (%)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Jun 21 Jul 1 Jul 11 Jul 21 Aug 1 Aug 11 Aug 21 Sept 1 Sep 11 Sep 21 Oct 1
Period Begins
□ Preferred Rx
+ Acceptable Rx

Fig 10.



Number of Burning Days Left
From Given 10–Day Period
Number Days (Jay Point)
45
40
35
30
25
20
15
10
5
0
Jun 21 Jul 1 Jul 11 Jul 21 Aug 1 Aug 11 Aug 21 Sept 1 Sep 11 Sep 21 Oct 1
Period Begins
□ Preferred Rx
+ Acceptable Rx